TERRA

THE NATURAL HISTORY MAGAZINE OF THE WEST
VOL. 19, NO. 3/WINTER 1981

Museum On The Move

Hawaii and the west coast of America have shared much in the way of common interest and historical development. Early European explorers tested the waters of the vast Pacific Ocean, using our coasts as jumping-off places pushing their explorations ever westward. Although the peopling of the Pacific islands occurred in aboriginal times from the opposite direction and the ancient Hawaiians and the ancient Californians never had an opportunity to meet, there exists somehow a common bond between Hawaii and California, ancient and modern, which derives from our occupying the edge of known worlds, the edge of frontiers.

On February 20 the Natural History Museum opens a magnificent exhibition from the Bernice Bishop Museum in Honolulu. This traveling exhibit marks the first time that holdings from the Bishop Museum have been shown outside of Hawaii. We are fortunate to have the opportunity to participate in *Hawai'i: The Royal Isles.* Not only is the exhibition one which has great public appeal, but it helps to accent this Museum's fine collections from the Hawaiian islands, not only in History and Anthropology but in Botany and the Zoological sciences. Continuing during the Bishop Museum exhibition will be the beautiful Hawaiian Flora exhibit on our second floor, as well as the recently renovated Pacific Cultures Hall. Both of these exhibits from our own collections contain spectacular Polynesian materials.

We are pleased to expand our interest in Hawaii and Polynesia at this time and to recognize the role Los Angeles continues to play as a gateway to The Royal Isles.

William B. Lee, Director

Curators & Collections

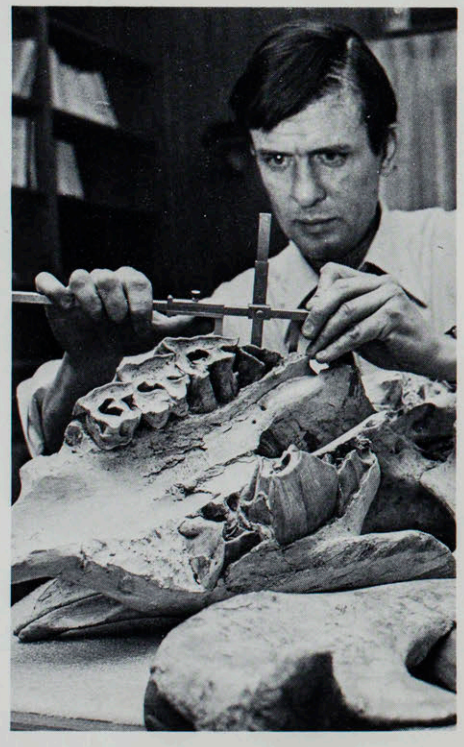
New Earth Sciences Chief

Dr. John M. Harris has joined the Museum as chief curator of the Division of Earth Sciences. Dr. Harris took over administration of the division from Dr. David P. Whistler who had been acting chief since the retirement of Dr. Theodore Downs in January 1980 (*Terra* vol. 18, No. 3).

Dr. Harris received his B.Sc. from the University of Leicester (England), his M.A. from the University of Texas (Austin), and his Ph.D. from the University of Bristol (England). It was while a graduate student at Bristol that he was invited by Louis Leakey to accompany Richard Leakey's first reconnaissance expedition to the eastern shores of Lake Turkana (formerly Lake Rudolf)—an area that was to yield prolific remains of early man and associated artifacts and fossil faunas.

After graduating from Bristol with a doctoral dissertation on Miocene fossil mammals from Libya, Dr. Harris spent a year teaching at Ahmadu Bello University in northern Nigeria before going to work for Louis Leakey in Nairobi, Kenya, in 1971 as Senior Paleontologist to the Centre for Prehistory and Paleontology. In 1972 the Centre became part of the National Museums of Kenya and Dr. Harris became Director of Paleontology at the latter institution until July 1979.

Dr. Harris's main research interests lie with the Plio-Pleistocene mammals associated with the remains of early man in Africa. He has worked with faunas recovered from the australopithecine-bearing cave breccias of South Africa, with Ethiopian fossil faunas recovered by the International Omo Research Expedition and International Afar Research Expedition, and with Tanzanian faunas recovered by Dr. Mary Leakey and her associates from Olduvai Gorge and Laetoli. The main bulk of his research activities has been with the faunas recovered by Richard Leakey's Koobi Fora Research Project in northern Kenya for which Dr. Harris has been Consultant Paleontologist since 1972.



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HAWAI'I

THE ROYAL ISLES

by NANCY J. BLOMBERG
Captions by ROGER ROSE
Photos by SETH JOEL

Halfway across the Pacific Ocean lies the chain of islands known as Hawaii. From end to end the long chain stretches 1600 miles and is composed of dozens of islands all of volcanic origin. In reality, the islands are merely the tops of a mountain range which lies on the floor of the Pacific Ocean.

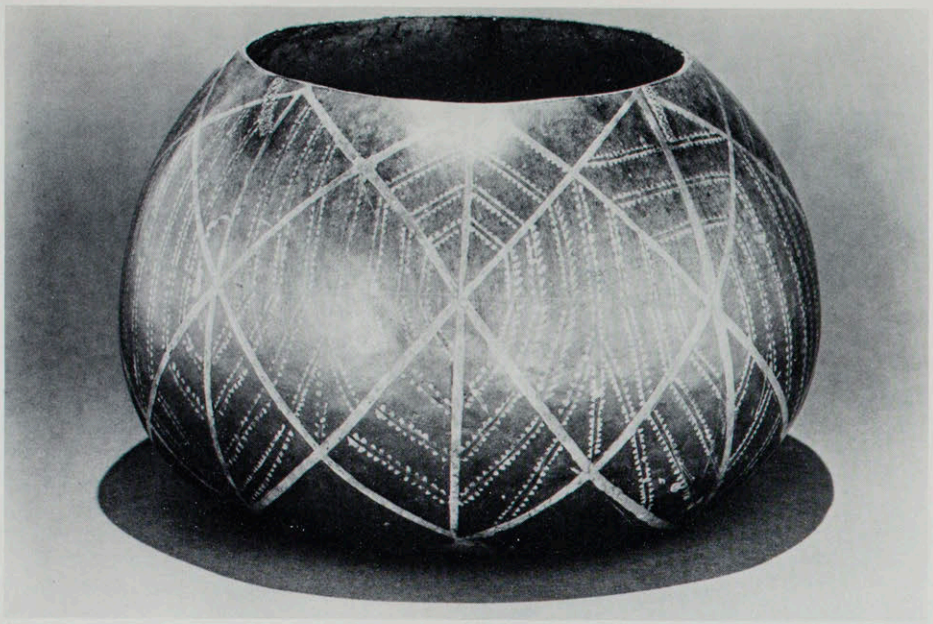
Because of the latitude and the effects of the trade winds the islands enjoy a warm, tropical climate. Taken as a whole, Hawaii's temperature averages 72°, but can vary greatly according to the altitude while amount of rainfall changes from east to west and north to south sides of the islands.

Hawaii's nearest land mass is California some 2500 miles to the east, with Japan nearly 4000 miles to the west. Given the enormity of the distances, it is a wonder these islands were ever populated. Yet they were inhabited by migrations more than a thousand years before being "discovered" by Captain Cook.

Feather Cloak, *'ahu'ula. Red* 'i'iwi, *yellow 'ō'ō, yellow* mamo *feathers,* olonā *cordage and netting.* L. 1612 *cm.* W. 291 *cm.*

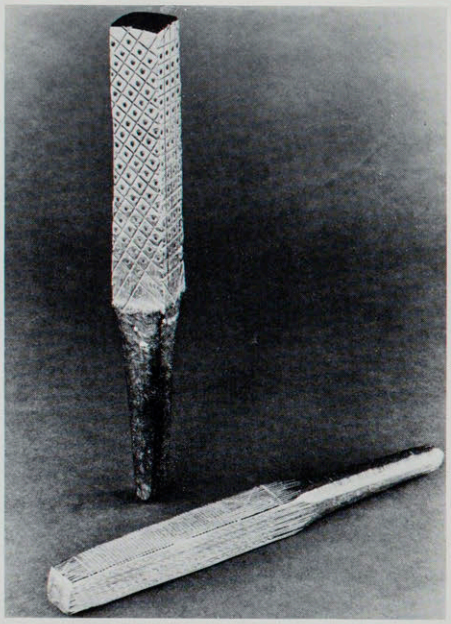
One of the largest known, this cloak must have belonged to a chief of imposing stature, since Hawaiian featherwork was never allowed to drag on the ground. Collected in August, 1789, during the voyage of the Columbia Redivia, *the first American ship to circumnavigate the globe, it was taken to Boston and worn by a young Hawaiian named Attoo—the so-called "Prince of Kaua'i," who walked down the street "looking like a living flame." The cloak acquired its present name after falling into the hands of the Joy family, who at one time had lined it with green fabric for a sleigh robe.*

The Joy cloak is one of two known with yellow disks on a red background. Most cloaks and capes have triangular or crescent designs in various configurations, which have no known or decipherable meanings.



Decorated Gourd Bowl, *'umeke pāwehe. Bottle gourd,* olonā *cordage.* H. 24.5*cm.* D. 39.7 *cm.*

Ordinary gourd utensils were utilized by the lower classes in lieu of the difficult-to-produce and therefore more costly wooden calabashes. Gourd utensils were also decorated for aristocratic tastes by means of a technique believed to have been restricted to the islands of Ni'ihau and parts of neighboring Kaua'i. This involved, according to one report, cutting a pattern through the outer skin of the gourd, peeling away unwanted areas to isolate the design, then immersing the gourd in swamp mud after soaking in an infusion of bark (Buck, 1957, p. 36). (The art was forgotten in the early 20th century, when the Hawaiian gourd is thought to have become extinct.) This example, with typical geometric motifs, has been painstakingly mended by zigzag stitching through paired holes along the edges of the cracks. Since the resulting lozenges resemble the meshes (maka) *of a net, the repair technique is sometimes called* 'aha maka.



Two Bark Cloth Mallets, *i'e kuku. Front:* L. 34 *cm.* W. 3 *cm.* Th. 3 *cm. Rear:* L. 37 *cm.* W. 4.2 *cm.* Th. 4 *cm.*

Once the bark had been peeled from the tree and the rough outer layer discarded, the inner fibers were soaked in water for several days until pliable. In a complicated and time-consuming process, the narrow strips were first flattened into foot-wide segments with a heavy cylindrical mallet, then beaten together with square mallets carved in various designs. The beaters, skillfully wielded by women, imprinted into the slightly moist kapa *continuous patterns similar to watermarks on paper. Visible through transmitted light, complex watermark designs became a hallmark of Hawaiian* kapa, *particularly in the late 18th and 19th centuries when introduced metal tools stimulated the carving of more intricate designs on the hard wood mallets.*

Feather Cape, *'ahu'ula. Dyed red and yellow duck feathers, black chicken feathers, mattress ticking, cotton, satin, thread, linen braid.* L. 68 *cm.* W. 5 *cm.*

At least a dozen capes nearly identical to this one in pattern, color, and craftsmanship exist, apparently relics of King Kalākaua's attempt to revitalize ancient science and lore through the semi-secret Hale Nauā Society he founded in 1886. Unfortunately, few details survive concerning their use, but capes made entirely of cloth figured prominently in pageants and parades during the early 20th century. It is apparent that skilled hands have carefully arranged the dyed feathers in familiar patterns and colors, even though materials and technique of manufacture differ radically from traditional capes.

Man from the Sandwich Islands with Feathered Helmet, Helmet Band, and Cape, by John Webber (1751–1793). *Watercolor, c.* 1780. 44 x 31.5 *cm.*

Webber's bearded Hawaiian wears a feather helmet surmounted by a low and wide crest, similar to certain ones known from late 18th-century Kaua'i. The separate helmet band, rare today in museum collections, "gives the whole headdress the appearance of a rich and elegant Turband," as Surgeon Samwell (Beaglehole, 1967, Vol. 3, Pt. 2, p. 1231) remarked during Cook's voyage in 1778–1779. His cape of long black feathers bordered by narrow bands of red and yellow was common enough in the late 18th century, but the type soon gave way to ones made entirely of red and yellow feathers.

Feather Hat Lei, *lei papa. Dyed yellow rooster feathers, paper, cotton, thread, glue.* L. 58.7 *cm.* W. 10 *cm.*

When the wearing of European style hats made of plaited coconut leaf and other materials became popular in the mid-19th century, feather lei *were "flattened" out and adapted for use as colorful hat bands. This early example still retains a fullness reminiscent of the traditional circular variety, although the feathers are sewn to only one side of a flat paper and cloth backing, rather than tied around a sturdy fiber core.*

Feather Hat Lei, *lei papa. Peacock feathers, wool, thread.* L. 64 *cm.* W. 5.7 *cm.*

This is a fine example of overlap patterning that can be achieved by careful placement of individual feather elements—in this case the central iridescent "eyes" of peacock tail feathers.

Wooden Image. Kauila *wood.* H.57 *cm.* W.51.3 *cm.* Th. 9.5 *cm.*

Purchased on May 7, 1877, for the Hawaiian National Museum at the estate auction of Charles Kana'ina, father of King Lunalilo, this image was at the time believed to be Kū-kā'ili-moku (Kū-Snatcher-of-Islands), war god of Kamehameha I. It is illustrated in King Kalākaua's book, The Legends and Myths of Hawaii, *and described in the introduction by R. M. Daggett:*

Among the celebrated war-gods of the kings of the group was that of Kamehameha I. It was called Kaili, *or* Ku-Kaili-moku, *and accompanied the great chief in all of his important battles. It had been the war-god of the Hawaiian kings for many generations, and was given in charge of Kamehameha by his royal uncle, Kalauiopuu [Kalani'ōpu'u]. It was a small wooden image, roughly carved, and adorned with a head-dress of yellow feathers [now lost]. It is said that at times, in the heat of battle, it uttered cries which were heard above the clash of arms (Kalākaua, 1888, p. 44).*

While this attribution may be conjectural, the image is a superb example of Hawaiian sculpture. J. Halley Cox and William H. Davenport (1974, p. 165, Fig. 14) call attention to the abstract form of the jaw line and head crest, which is said to resemble the lei niho palaoa, *a whale tooth ornament worn by chiefs. Other authorities liken the face to that of Kamapau'a the pig demigod and symbol of lechery, whose rootings created valleys and springs throughout the islands.*

Wooden Image. H. 36.5 *cm.* W. 7.7 *cm.* Th. 4.6 *cm.*

Possibly an akua *kā'ai, or portable image with pointed prop (to use the terminology of Cox and Davenport, 1974, this god figure is typically Hawaiian in sculptural form, despite an old handwritten label inscribed, "Tahiti, Gesellschafts-Inseln, vor 1775, Götzenbild" (Tahiti, Society Islands, before 1775, God-figure). Purchased at Sotheby's of London on December 7, 1971, nothing more is known of its history except for an unexplained collector's number written on the back in old script, "A. K. 176." Probably carved in the mid- to-late 18th century, the image once held mother-of-pearl insets in the vacant eye sockets, like those found on many other Hawaiian images.*

By 3000 B.C. the ancestors of today's Polynesians began moving out of Southeast Asia into Melanesia. From here successive waves of people spread out across the vast stretches of the Pacific and settled the various island groups. As population pressures increased and navigational skills sharpened, longer and longer voyages were undertaken. Finally, around 600 A.D., it is thought that people from the Marquesas reached Hawaii.

Linguistic evidence points to contact with Tahitians from time to time over several hundred years until about 1200 A.D., when the long voyages between Hawaii and Tahiti stopped. For the next five hundred years the people of Hawaii were isolated from further contact and developed their own unique culture.

When the earliest people arrived in Hawaii they did not discover a land teeming with abundance. Though food from the sea was plentiful, most of the domesticated plants (yams, breadfruit, bananas, coconuts, taro and sugar cane) and animals (pigs, dogs and jungle fowl) used by the ancient Hawaiians had been carried with them from their ancestral homelands. Excellent seafarers, the early Polynesians equipped their large ocean-going canoes well for the long voyages and transplanted these food resources to their new homes.

Fish were the main source of protein in their diet and large salt water fish ponds were constructed to ensure a constant supply of fish the year round.

The real staple of Hawaiian meals was *poi*. Made from a variety of plants (sweet potato, taro, banana or breadfruit) the plant was first cooked, then thoroughly mashed and finally allowed to ferment to the individual's preference. Served up in elaborately carved and polished koa wood bowls, the poi was eaten by dipping in one, two or three fingers depending on the thickness of the mixture.

The mild climate found in Hawaii did not produce a need for much clothing. What garments were necessary for protection from the elements were made of bark cloth or *tapa*. Large sheets of tapa were also used as bedclothes. Using the inner bark (primarily of the paper mulberry tree), the Hawaiians first soaked the material in sea water and then pounded it flat with carved wooden beaters to the desired size. Designs were painted on or stamped on in a variety of patterns and colors. Although tapa is made by peoples throughout the world, because of its extreme fineness and water-marked surface Hawaiian tapa is considered far superior to other tapa cloth.

Elaborate ceremonial costumes were developed solely for the use of high ranking chiefs. Fashioned primarily from bird feathers, they are some of the most spectacular products of Hawaiian culture. Clusters of colorful bird feathers were attached to a foundation of *olonā* fiber netting. Short capes were worn by lesser chiefs, for only the highest ranking chiefs had the resources necessary to gather enough feathers for a full length cloak.

One cloak in the Bishop Museum's collection was painstakingly analyzed by counting the numbers of feathers per square inch and multiplying by the total

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Wooden Image. H. 108 *cm.* W.13.5 *cm.* Th. 11.3 *cm.*

From the same Forbes Cave burial chamber, this and a nearly identical companion in Bishop Museum (9068) are the largest and best examples of a class of portable images sometimes called akua kā'ai. *The elaborate headdress may represent abstractions of symbols associated with the gods—such as the rainbow or the "eight foreheads of Lono" —or perhaps proliferations developed simply for dramatic effect. The notched vertical extensions of the head, possibly conventionalized representations of hair braids, appear on other life-sized images thought to be characteristic of the Kona coast of Hawai'i. The facial expressions, suggesting contempt, ferocity, haughtiness, or power, are also typical of the so-called Kona style, which developed in the late 18th century after introduced steel tools facilitated an efflorescence and elaboration of the woodcarver's art.*

number of inches in the cloak. The figure arrived at was 450,000 feathers. In order to grasp the enormity of the undertaking we must realize that the birds furnish only six or seven suitable feathers, thus requiring approximately 80,000 birds to complete a cloak. Clearly, not an undertaking for the average person! In addition to capes, cloaks, and necklaces, elaborate crested helmets with woven plant fiber foundations were covered with brightly colored feathers and worn by chiefs into battle.

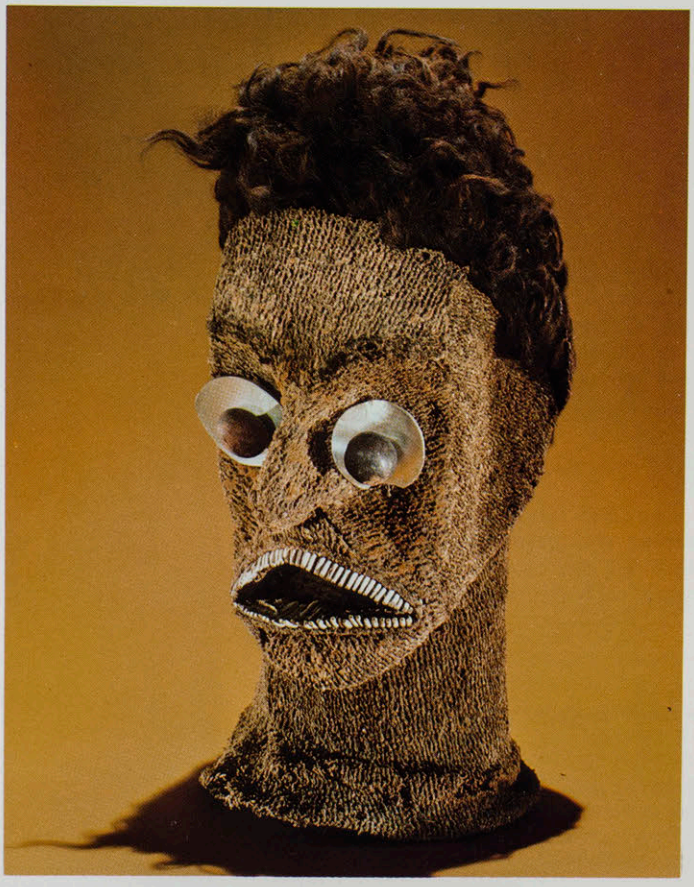
To the Hawaiians religion was an integral part of life. They recognized and sought supernatural help from a number of gods. The four major state gods were Kanaloa, Kane, Ku and Lono and had temples erected in their honor. Priests conducted rituals at these temples and people brought offerings. A series of lesser or personal gods were also worshipped, but on a more individual basis and without benefit of elaborate shrines.

Images of the gods were finely crafted from wood to symbolize the particular god intended. Some images were carved with long pointed ends to support the figure in the ground near a shrine. Occasionally a naturally shaped stone or one that was simply shaped represented a god. And finally some gods were fashioned from woven plant fiber and carefully covered with feathers.

Hawaiian society was highly stratified. Chiefs of various rank were at the top, priests and skilled craftsmen next, commoners, and finally slaves. Each person had his specific place in a society that functioned smoothly by the strict observance of *kapu* (taboos). *Kapu* were elaborate restrictions which governed activities and established behavior depending on rank. There were prohibitions against specific foods and especially against men and women eating together. Whenever *kapu* were broken, whether intentionally or not, it was believed that the well-being of the group as a whole was in danger. Punishment for such an action was usually death.

Hand in hand with the concept of *kapu* was that of *mana* or sacred power. The gods had this *mana* in abundance and could transfer it to persons of high rank. Many of the *kapu* were established to protect and safeguard the *mana* of high-ranking persons. Specially carved refuse bowls were used to collect the scraps of food left over from a chief's meal or to collect bits of his hair and fingernails. If these things fell into the hands of an enemy, sorcery could be used to destroy the chief's *mana*.

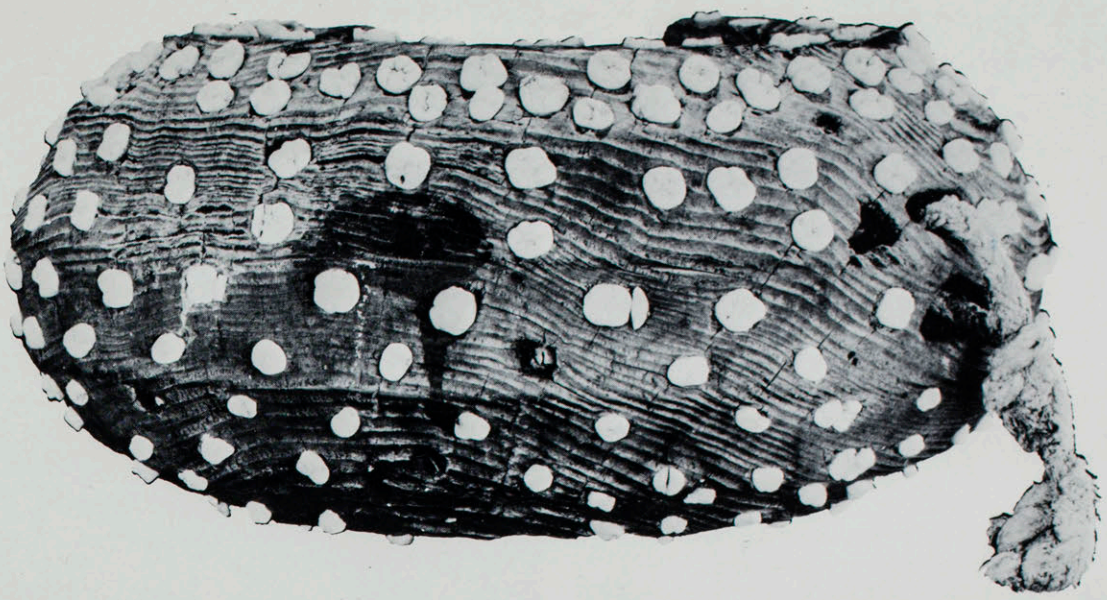
Music and dancing were important elements in Hawaiian life, serving both as a form of prayer to the gods as well as community entertainment. Chanting, recitation of poetry and dancing were



Turtle Shell Bracelet, *kūpe'e 'ea. Turtle shell, boar tusk, bone,* olonā *cordage, coconut sennit (modern).* H. 6.3. *cm.* D. 10 *cm.*
One of a pair presumed to have descended in the Kamehameha family, this is undoubtedly one of the most remarkable Hawaiian ornaments in existence. It possesses an elegance of proportion and harmony of color surpassed only by the maker's sense of imagination. The projecting skull-like figures have mischievous, almost whimsical expressions that remind one of the support figures carved on certain wooden bowls.

Feather-covered Basketry Image. 'Ie'ie *aerial rootlets, human hair, mother-of-pearl shell, wood, dog tooth incisors,* olonā *netting, red* i'iwi *and yellow* 'ō'ō *feathers.* H.52.2 *cm.* W. 20.8 *cm.* Th. 31 *cm.*
Unique to the Hawaiian Islands, such feather gods epitomize the high technical achievements of the feather-working and basketry arts. Constructed of split aerial rootlets of a mountain vine arranged into warps and wefts, the twined foundation is covered with a closely woven nae *netting of tough and durable* olonā *fibers, to which are tied tiny clusters of red and yellow feathers, now mostly disappeared. The image is finished with disks of mother-of-pearl shell and wooden pegs to represent the eyes, while some 74 dog incisors outline the gaping mouth. On this and about half of the two dozen surviving feather images, the head is adorned with tufts of human hair, instead of the crests found on feather helmets.*

Traditionally, these images have been linked with Kūkā'ili-moku, the famous war god of Kamehameha I, but the attribution is based mainly on incomplete historical records of one particularly well-preserved specimen in Bishop Museum, believed to have belonged to the great warrior chief. Conceivably these images represent other gods as well, but evidence is simply too tenuous to assign to them any more definite role in the traditional religious system.



Refuse Bowl, *ipu 'aina. Douglas fir, human teeth,* olonā *cordage.* H.14.5 *cm.* D. 28.1 *'cm.*

Made from driftwood from the Northwest Coast of America, this unusual refuse container, inset with no less than 289 human molars and premolars, was handed down by the Kamehameha and Kalākaua dynasties until the end of the Monarchy. Unfortunately, its historic associations are now lost, but the object must have been considered important, for Kamehameha V sent it to the Paris Exposition Universelle *of 1867. Later, King Kalākaua seems to have taken it from its place of honor in the old Hawaiian National Museum for occasional display by his Hale Nauā Society.*

Pair of Coconut Dance Rattles, *'ulī'ulī. Coconut shell, chicken feathers, cotton and silk, leaf stems, wire, trade cordage, thread, wild canna seeds* (ali'poe).

Left:* H. 28.5 *cm.* D. 21.8 *cm.
Right:* H. 23.5 *cm.* D. 21.5 *cm.

Also a Hawaiian specialty, small coconut or gourd rattles containing a few seeds or pebbles were used to accompany many different kinds of hula. *Decorated with feathers, bark cloth, or imported fabrics, they add an interesting visual component to the rhythmic movements of the dancers, who shake and strike the rattle against their palms and other parts of the body. Traditionally only one* 'ulī'ulī *was used, but new* hula *styles in the 20th century introduced two rattles, one in each hand (Yatar in Kanahele, 1979, p. 408). Second in importance only to the gourd drum as an accompanying instrument in the early 20th century,* 'ulī'ulī *decorated with bright red or yellow dyed feathers are still one of the most popular accouterments of the modern* hula. *This pair was probably exhibited by the Hawaiian government at the Paris* Exposition Universelle *of 1889.*

The Death of Cook, by George Carter (1737–1794). *Oil on fabric, c.* 1783. 76 x 91 *cm.*
The death of Captain James Cook at Kealakekua Bay on February 14, 1779, thrust the Hawaiian Islands into the forefront of European thought. Numerous illustrations were made to commemorate the event, but few stirred the popular imagination more than the famous painting (several versions exist) by George Carter, a noted British painter of historical events.

Sailing north from the island of Tahiti into uncharted seas the year before, Cook sighted O'ahu, the first of the Hawaiian Islands, on January 18, 1778. Two days later his ships, the Resolution *and* Discovery, *reached Kaua'i, and after a brief stay at the village of Waimea, and the nearby island of Ni'ihau, they headed toward the northwest coast of America for further discoveries.*

Returning in November to winter, Cook anchored at Kealakekua Bay on the west side of the island of Hawai'i on January 16, 1779, after seven frustrating weeks seeking a safe harbor. His ships generously provisioned and the men rested, Cook sailed away three weeks later, only to be driven back for repairs after a heavy gale. The wearied hosts, nearly exhausted of food as well as patience, found it increasingly difficult to avoid provocations with the English. When the Discovery's *cutter was stolen during the night of February 13, an exasperated Cook went ashore next morning to take as hostage high chief Kalani'ōpu'u, ruler of the island. A skirmish erupted, and in its wake four marines, several Hawaiians, and the renowned navigator lay dead.*

accompanied by a variety of musical instruments including drums, rattles, whistles and flutes. The familiar *hula* dance was a later innovation with the body movements serving as a stylized interpretation accompanying the poetry.

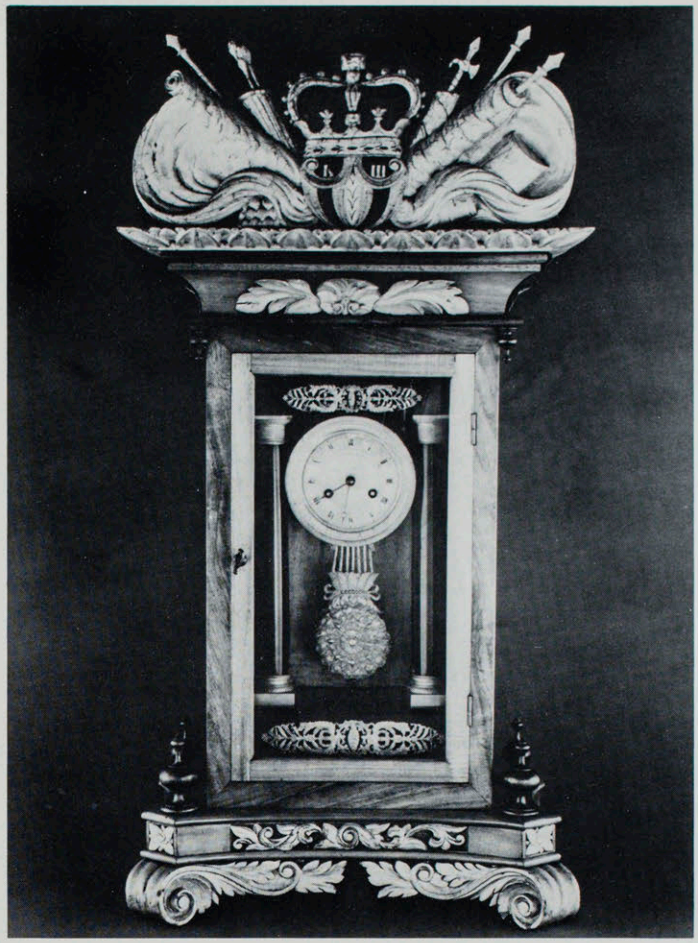
Bodily adornment often took the form of tattooing. Additional decoration was supplied by ivory and shell necklaces and bracelets as well as feather and flower leis.

The renowned British navigator, Captain James Cook, was the first Westerner to visit Hawaii. In 1778, on his third voyage in search of the Northwest Passage, he sighted the Hawaiian Islands and promptly dubbed them the Sandwich Islands in honor of his patron, the Earl of Sandwich. Once the news of Cook's discovery and then his sudden death at the hands of the natives reached the rest of the world, Hawaii's five-hundred-year isolation was ended. Changes in Hawaiian culture were numerous and rapid. The influx of foreigners brought with it new material goods but, most important, a new value system that would soon clash with the old Hawaiian order.

While Westerners were getting their first glimpse of Hawaii, a local chief by the name of Kamehameha was engaged in a series of battles to unify all the small chiefdoms under his solitary rule. By 1810 he was proclaimed "king," thus beginning the Kamehameha dynasty which was to last nearly one hundred years and radically change the Hawaiian political system. This change was further accelerated in 1819 when Kamehameha II, upon succeeding his father to the throne, was persuaded to abandon the old system of *kapu*. His deliberate act of eating with women brought an end to this important religious restriction. Pressure had been mounting within Hawaii for years, as the old system became unworkable in the face of flagrant violations by the newly arrived foreigners. Thus when the first missionaries arrived in 1820, just shortly after the collapse of the old religious order, they found many eager converts.

The succeeding kings of the Kamehameha dynasty became increasingly influenced by Western ways. Kamehameha IV was especially taken with the trappings of the English monarchy and began to pattern his court after British court life.

By this time the native population had dwindled to a fraction of its pre-1778 level, due to the introduction by Westerners of diseases such as smallpox and measles to which the natives had no natural resistance. To offset this loss in the native labor force, large numbers of Chinese and Japanese laborers were imported to work in the rapidly expanding sugar plantations. The end of the Kamehameha dynasty came in 1872 when Kamehameha V died without leav-



Clock of Kamehameha III. Koa *wood, glass, metal, marble, ormolu.* H. 91 *cm.* W. 49 *cm.* Th. 26 *cm. (case). Clock marked: "Brothers Melly"*

This clock case is thought to have been part of the royal household possessions transferred to Honolulu from the old capital at Lahaina, Maui. The Polynesian *for February 15, 1845, called attention to such a carved clock case, reflecting "much credit upon the makers, Halstead & Hoyt, of Lahaina... worthy of the examination of the curious... We need not look abroad for superior cabinet-work hereafter, while the country can produce such excellent specimens, both of work and woods." Decorated with a simplified "K III" monogram, red and white bunting, and other heraldic devices, the ornate case was for a clock presented to Kamehameha III in the 1840's.*

"Aloha" Bracelet. *Human hair, gilt, pearl, glass, ? bone and horn* D. 8.6 *cm.* H. 3.6 *cm.*

Princess Bernice Pauahi Bishop gave Lili'uokalani this treasured keepsake, made from the hair of her own father, who was also Lili'uokalani's foster father. Victorian in style, yet deeply Hawaiian in sentiment, it is a reminder of the attachment Lili'uokalani retained throughout her life for her ancestral heritage.

ing an heir apparent. But the monarchy continued when the Legislature appointed David Kalakaua as the new king in 1874. He too enjoyed surrounding himself with British inspired objects including crown, scepter, coat-of-arms, and a series of Hawaiian royal orders.

He was succeeded to the throne by his sister Lili'uokalani in 1891 but she was to reign for only two years. The Hawaiian monarchy had ended. In 1900 Hawaii became an American Territory and in 1959 our fiftieth state.

Mention the word "Hawaii" today and thoughts of a tropical paradise with lush vegetation inhabited by simple and carefree natives will probably come to mind. This common misconception does a great disservice to a people who settled in Hawaii long before the arrival of Captain Cook in the eighteenth century. They had developed a flourishing culture uniquely their own which has persisted, despite changes, through the intervening two centuries.

In 1886 King Kalakaua founded the *Hale Nauā* Society to promote "the revival of Ancient Science of Hawaii in combination with the promotion and advancements of Modern Sciences, Art, Literature, and Philanthropy" *(Hale Nauā* Society Constitution*)*. It died with his death in 1891.

Twentieth-century Hawaiians have revived the *Hale Nauā* Society and seek to continue where the original society left off. Society founder, Rocky Ka'iou liokahihikolo'ehu Jensen expresses their philosophy:

> "Culture is a living entity which should grow and change with time. Therefore, to understand what we are today, we must first know and understand our past, for the solution to today's problems lies therein. The form which culture takes today must have its roots in what has come before. The remolding of an 'injured' culture is a slow ongoing task. It must begin with the gathering of material about the past. Only then can we give new meanings to the culture of the present and ensure the security of OUR FUTURE."

Nancy J. Blomberg is Assistant Curator of Anthropology and is responsible for the Hawaii exhibit while it is in Los Angeles. Roger Rose is Curator of Ethnology at the Bishop Museum and is one of the originators of the exhibit.

Crown of Hawai'i. ***Gold, diamonds, opals, emeralds, rubies, pearls, carbuncle, enamel,*** **kukui** ***nut, velvet, silk.*** **H. 20.5** ***cm.*** **D. 25** ***cm.***

The Coronation regalia of King Kalākaua and Queen Kapi'olani combined European insignia with ancient symbols of Hawaiian royalty. The Crowns, ordered from England in 1882 for £1,000 (plus £3 3p. extra for silk and velvet linings), were described with appropriate splendor by the Pacific Commercial Advertiser *in its famous account of the Coronation:*

"The Crown is composed of a fillet or band of gold one inch in width, set, on each edge, with 192 small diamonds. Midway in the fillet are set 20 opals, alternating with 8 emeralds and as many rubies, save at the back, where there are set in the place of the emeralds and rubies 6 kukui *nut jewels of a deep reddish black, highly polished.*

"At the front and back, and on each side, the fillet surmounted by a golden Maltese cross, in the arms of which are set forty-eight diamonds, each arm having three. In the center of the cross in front of the crown is a magnificent diamond about six carats' weight, and on the sides others a little smaller. A splendid carbuncle glows in the center of the cross at the back. Between the crosses are short curved bars forming twelve points, from which spring taro leaves in frosted gold, beautifully veined, and each one holding a diamond in its center. Between the points are set twelve other fine diamonds. Springing from the fillet, over the crimson velvet cap of maintenance, are eight bars of gold, whose surfaces are studded with half-round knobs, as in the crown of France. These eight bars diminish in width, and finally unite at the base of a globe of dark red enamel. These eight bars are emblematical of the union of the islands of the group under one rule. The globe that they uphold is banded horizontally with a circle of pearls, and another like band passes over the upper half of the globe. Surmounting the whole is a golden Maltese cross, in which is set four brilliant diamonds... Each crown contains 521 diamonds, 20 opals, 8 emeralds, 1 large carbuncle, and 6 kukui *jewels."*

The Crown exhibited here is Queen Kapi'olani's. The King's Crown was pillaged by vandals breaking into 'Iolani Palace in 1893, later recovered, then forgotten until 1925 when the Legislature appropriated $350 for its restoration, using synthetic materials.

King Lunalilo as a Young Man, unknown artist. ***Oil on fabric.*** **92 x 69.2** ***cm.***

William Charles Lunalilo was the first Hawaiian monarch elected to the throne. Distantly related to the Kamehameha line of succession, Lunalilo pressed his claims as closest and rightful heir and by popular acclaim was elected to office on January 8, 1873, winning almost unanimously over his closest rival, David Kalākaua. Well educated and devoted to music and English literature, he was ill-suited to office. In poor health and addicted to alcohol, he lacked practical experience as well as administrative skills, his financial affairs having been managed by guardians most of his life. Reigning one year and 25 days, he succumbed to pulmonary tuberculosis on February 3, 1874, three days after his 39th birthday. He was respected and admired as a "people's king," and left the bulk of his estate to establish the Lunalilo Home for the poor, destitute, infirm, and elderly of Hawaiian extraction.

Throne of Kamehameha III. Koa *wood, silk brocade* (1979 *reupholstery based on* 1889 *restoration).* H. 173.5 *cm.* W. 89 *cm.*

In July, 1844, the capital moved permanently to Honolulu, and a one-story brick and coral structure just completed by O'ahu Governor Kekūanaō'a for his daughter, Princess Victoria Kamāmalu, became the first 'Iolani Palace. Realizing the necessity of carrying on the business of government with etiquette befitting his court's growing dignity, the King commissioned a local German cabinetmaker named Christian LaFrenz to make a state chair of native koa *wood for the new palace. It was surmounted by a likeness of the Hawaiian crown, which had come into general use the year before as a symbol of office. Ready by November, 1847, for $138.00 (which included a matching footstool, now lost), the first Hawaiian throne was used by succeeding monarchs until King Kalākaua had a gilded pair of Gothic design made in Boston in 1882 for the second 'Iolani Palace.*

THE COVER

Hawaiian Coat of Arms, artist unknown
Oil and gilt on glass* c. 1882. 61 x 61 *cm.

The royal Coat of Arms came into existence when Rev. William Richards, adviser to Kamehameha III, and Timothy Ha'alilio, private secretary, were sent to America, France, and Great Britain in 1842 to negotiate treaties guaranteeing the continued independence of Hawai'i. Commissioned also to seek help with a royal seal or crest, the delegation consulted with professionals in Brussels and Paris before settling on a design suggested by Ha'alilio and prepared by the Herald's College, London. The design finally adopted for use in 1845 served, with minor modifications, throughout the Monarchy and is the basis for the present Great Seal of the State of Hawai'i.

This version, incorporating the Crown of Hawai'i, the initials "K.R." for Kalakaua Rex, and a representation of the Order of Kamehameha (bottom) was prepared just before the Coronation of 1883. The quartered shield bears red, white, and blue stripes representing the eight inhabited islands, and two pūlo'ulo'u *staves or emblems of taboo (see No. 45.). The triangular flag and crossed spears forming the central escutcheon are ancient chiefly insignia, while the supporters, holding a* kāhili *and spear, are the chiefly twins Kameeiamoku and Kamanaawa. They are dressed in feather cloaks and helmets allegedly copied from actual specimens collected by Captain Cook in 1778–1779. The scroll bears an early version of the national motto, the third word not yet having changed from* ka *to* ke *for grammatical euphony. Completing the Hawaiian symbolism, the background is an open feather cloak, whose crossing lines represent the undernetting to which the feathers are attached.*

Hawai'i: The Royal Isles, *current exhibition at the Natural History Museum, was organized and developed by the Bernice Pauahi Bishop Museum in Honolulu. The exhibit includes 305 objects from their extensive collections, among them many pieces which have never been seen outside of Hawaii previously.*

Supported by the National Endowment for the Humanities and United Airlines, this exhibit will travel to eight American museums before returning for its final presentation at the Bernice P. Bishop Museum in the winter of 1983. It will remain at our Museum through April 26, 1981.

LOS ANGELES PLAZA

Living Symbol of Our Past

by WILLIAM MASON and JEANNE DUQUE

The Plaza was the focus of the Los Angeles community, as was the case in other towns in Latin America. Los Angeles in the early 1800s was not radically different from other small Mexican villages in northwest Mexico. Civil and religious edifices were to be found there, even if this meant only a guardhouse and a chapel. The Plaza was usually the place where the wealthier people of the community lived. Los Angeles was not sharply divided into haves and havenots for the first fifty years of its existence. Only after the emergence of a few wealthy rancheros by the 1830s do we have a developing group of gentry, whose homes might be found in or near the town center.

The exact location of the first Los Angeles Plaza is a mystery. It does not appear to have been in its present location, nor was it in the often-cited spot immediately to the northwest of the present Plaza. A reference or two suggests an original site several blocks south of today's location, but there is no certainty of such a Plaza south of Fifth Street and east of San Pedro Street. Descriptions of 1789 and 1790 do state, however, that the little pueblo of that time was of easy access from all sides, suggesting that the Plaza of that time was not adjacent to Fort Moore Hill, as it was later.

Whatever the original location may have been, by the early 1800s the Plaza was probably near its present location, and may have been moved to higher ground during the 1790s in response to rampages of the Los Angeles River. A change in course during the flood of 1815 prompted another move, with more substantial documentation, this time to a spot just northwest of today's Plaza. We know that the Plaza Church was moved to a place less exposed to flood on the recommendation of Governor Sola by 1818. It is not unusual for Mexican churches to flank, rather than face, the town square, and such would have been the case with the Plaza directly north of the church.

We know some of the families who lived in the immediate vicinity of the Plaza *circa* 1820. Jose Antonio Carrillo acquired a houselot on the present site of the Pico House in 1821. His neighbors, mentioned in his title to the lot, were Encarnacion Urquides and Francisco Sepulveda. Shortly after this time Vicente Sanchez built what must have been the marvel of Los Angeles. He constructed a two-story house with a tiled roof. Surely the structure towered over the tarred flat roofs of the one-story adobes in the little town.

Mariano Verdugo lived just north of the present Plaza, next to the house of Bartolo Tapia, by the 1820s. Francisco Avila's house was north of Verdugo's and Tapia's houses, on what is now Olvera Street. Immediately west of these houses were the Polloreno and Palomares families.

An interesting and unresolved problem is the location of two adobes just north of East First Street between Main and Los Angeles Streets. These were the houses of Francisco Alvarado and Guillermo Cota. Both men were *comisionados* of the Pueblo. Alvarado served from 1795 to 1810, and Cota was his successor, serving from 1810 to 1818, and again for a short time later. A *comisionado* was a sort of Indian agent, police chief, military attaché, and pueblo manager. Why the *comisionados'* houses were so far from the town square is difficult to conjecture, unless the Plaza

OPPOSITE PAGE, TOP: *A view of the Plaza in 1847, showing the Church in middle foreground, and the Avila Adobe in the center background. To the right is the Lugo Adobe, prior to the addition of a second story. This is one of the earliest views known of the Plaza.*

TOP: *The Plaza Church, 1867. Sketch by William Henry Jackson. Courtesy National Park Service, Scott's Bluff National Monument.*

BOTTOM: *This is one of the earliest known photos of the Plaza. The Church is at the far left in the foreground, the two-story Lugo Adobe in the left center background. The small building with the tile roof and whitewashed walls in the right foreground is the Carrillo Adobe, built about 1821. The house with the pitched roof immediately behind it is that of Pio Pico. The alley leading to the right of Pico's adobe is Calle de los Negros. In the center of the Plaza the odd-looking brick structure is the city reservoir. The one-story adobe on the east side of the Plaza next to Calle de los Negros is that of Ignacio del Valle, who rented it out as a medical building in the 1860s. Photo* circa *1865.*

had been nearer to First and Los Angeles Streets at one time. A suggestion that the earlier site for the Plaza Church had been near Aliso and Alameda Streets, and that a pre-1815 Plaza had been there gains some credence with the *comisionados'* houses somewhat closer to a Plaza south of the present one.

THE CENTER OF ACTIVITY

When the Americans seized Los Angeles in 1846, lost it, and retook it in 1847, the Plaza was indisputably the center of social and commercial activity. For another twenty years under the American flag the Plaza retained much of its prestige, as we shall see. Within five or six years of U.S. rule, however, the commercial activity of Los Angeles began to shift southward. Merchants, both European and American, congregated one to two blocks south of the Plaza. Tinners, blacksmiths, and wagon-makers were to be found on Los Angeles Street. The construction of John Temple's market building in the late 1850s well south of the junction of Temple and Main was a fair indication that commerce was moving south. When, a few years later, his building became the court house, the move away from the Plaza had become more pronounced.

During the 1850s, also, the Plaza became something of a linguistic boundary. North of the Plaza the only language heard was Spanish; to the south, English, German, and French could also be heard. The dominant ethnic group in Los Angeles was Mexican, comprising fifty percent of the population. Nearly all the *Californios* could point to Sonoran or Sinaloan ancestors, and the majority of recent arrivals from Mexico were also from Sonora. It is not surprising, therefore, that the area to the north of the Plaza came to be known as Sonoratown during the 1860s, when the southern half of the city was basically English-speaking. To be sure, much of the English was strongly flavored with French, German, or Spanish accents, but by 1870 only about thirty-eight percent of the city was Mexican. Ten years earlier fully half of the city had been Mexican. Though the total population had increased, the city's Mexican population had not, in fact it appears to have decreased by as much as eight to ten percent. A few Mexicans had moved to some of the ranchos still in their relatives' hands. Others had moved to farming areas, such as Los Nietos or San Gabriel, to work as farmhands.

By the end of the 1840s, shortly after the Americans had ended resistance in Los Angeles, the Plaza was an empty square, without grass, shrubs, or other ornament. On the southwest corner was the neat, tile-roofed adobe of Jose Antonio Carrillo, built in the early 1820s. Continuing on the south side of the Plaza to the east was the adobe of Pio Pico. Next, and a bit back from the Plaza, was the home of Francisca Uribe de Ocampo, wife of Francisco Ocampo and widow of Juan Leandri, an Italian merchant who had been a wealthy man. A little thoroughfare some fifty feet wide intervened in the southeast corner. This was the renowned Negro Alley. On the other side of the alley was the home of Ignacio del Valle, another of the political luminaries, such as Carrillo, Pico, Downey, and Olvera. This house had been built by Mateo Sabichi, a native of Trieste, and a merchant in the town, who later sold it to del Valle. Continuing northward on the east side of the Plaza was the small Ballesteros home, and flanking it was the Lugo adobe, which became a two-story town house in the 1850s. Vicente Lugo, the owner, was a son-in-law of the Ballesteros family, and may have acquired the property from his in-laws. Next to the Lugo house was that of Ascension Navarro, a small house at the end of the east side of the Plaza. A lane leading down to the *zanja* (irrigation ditch) on Alameda Street was between the house and lot of Juan Sepulveda and the Navarro adobe. Sepulveda's house was in a state of disrepair, and by the 1860s stood a roofless ruin in the northeast corner of the Plaza. Next door to this house was that of Agustín Olvera on the north side of the Plaza. This adobe had formerly belonged to Tiburcio Tapia, but it was Olvera who gave his name to the famous Olvera Street. North on Olvera Street was a ruin which had belonged to a Tapia family member, but by the 1850s was owned by Encarnacíon Coronel, and next door to it was the adobe which retains the name of its builder, Francisco Avila. It was property of the Gallardo family by the 1850s, for Avila's widow, Encarnacíon Sepúlveda de Avila, had married Juan Gallardo in the 1830s.

West of the Olvera adobe stood the house of José María Segura, an army officer who left California after the defeat of Mexico. His wife sold the property and probably left to join her husband. Included in the sale of the home were the accoutrements for a pool room along with a couple of pool tables, adding some credence to the idea that Segura had a casino in his home. This house became John G. Downey's. Across Main Street in the northwest corner of the Plaza stood yet another house belonging to Agustín Olvera. The area north of the church had stood vacant for several years during the time between 1835 and 1845, while Los Angeles was *de jure* capital of California. It was hoped by the citizens that the capitol building would occupy the spot. Los Angeles was the *de facto* capital under Governor Pío Pico, 1845–46, on the eve of the Mexican War, but before any edifice could be placed there for the government, the war changed any plans for a southern California seat of government. By the 1850s several adobes had been placed to the north of the church, and the one in the extreme northwest corner of the Plaza was acquired by a French-Canadian, Jose St. Onge. Across the street which later became Sunset Boulevard was a bakery, owned by Pedro Domec and Andres Mano (circa 1850). The priest's house and the church came next. The church, though not immense in terms of California mission architecture, was one of the more impressive buildings in town.

NEGRO ALLEY

Much has been said about the little lane which began on the southeast corner of the Plaza and went south to Los Angeles Street. It has been compared, with some exaggeration, to San Francisco's Barbary Coast. Though it is not inaccurate to say that Los Angeles was one of the roughest towns in the west between 1850 and 1870, it must be added that the reputation should be more evenly distributed throughout the town. Calle de los Negros, Negro Alley, or Nigger Alley, whatever one called it, was a block-long row of adobes housing several businesses, among them saloons and prostitutes' cribs. Secondary sources, when recalling Negro Alley, convey the idea that it was a sinkhole of depravity whose denizens were either Indians, Mexicans, or Chinese. It is true that between 1865 and 1875 the little street came to be almost exclusively Chinese, though it was by no means exclusively devoted to vice, much less drinking during its Chinese tenure. It is also quite true that during the 1850s Indians frequented the street to do some drinking, gambling, and general hell-raising, but they had plenty of company in these pursuits. Judging from the occasional newspaper articles about businesses in Negro Alley, several were conducted by Anglo-Americans. Charles Borroughs, William Corbett, the partnership of Gaylord and Tibbetts, and one Nelson were also in business there during the early 1850s. These men had livery stables, saloons, and a restaurant (Nelson's Opera Restaurant). A pawnshop, butcher shop, grocery store, and a barber shop were other businesses in Negro Alley. From Saturday night and all through Sunday Indian laborers from the nearby vineyards and farms congregated, drinking wine and brandy purchased in the little adobe saloons. Women and men alike, stripped to the waist, staggered about the alley in a torpid condition. Unlike whites, however, Indians were arrested and fined for drunkenness.

One of the more cultural pursuits to be found in Negro Alley was the theater. On the east side of the alley was the house of Vicente Guerrero, where his son, Rafael, put on Spanish-language plays. Classics of Lope de Vega and Zorrilla were among those given. "Don Juan Tenorio," "La Familia del Mendigo," and "Cada Cual con su Razón" were seen in Los Angeles during the season of 1852–1853. To be sure, duels, brawls, theft, and vice were

The Pico House, summer, 1870. Opened in June of 1870, the Pico House was the most impressive building in Los Angeles. Ezra F. Kysor was the architect, Commodore Perry Switzer and Christopher Stappenbeck were the builders.

aspects of life in Negro Alley during the 1850s and 1860s, and may well have been so during the 1840s. But in the early 1850s, it would certainly seem that there was more to life in Calle de los Negros than is typically featured in most books which treat Los Angeles history during the period. It would be fairer to say that Los Angeles as a whole had more than its share of killings, gambling and sordid behavior, and that much of such behavior went on in the little street.

FESTIVITIES

The Plaza served as a circus grounds during 1858 and 1859, when a large tent or pavilion was placed on the north side of the square. Lee's Circus wintered there in 1858 and Washington's Circus came to the same spot in 1859. For several days in 1853 Pio Pico had a series of cockfights in the Plaza with Jack Powers. This was before Powers openly manifested his ability as a highwayman. In the same month there was a rousing game of shinty, a team sport much like lacrosse, in the mud-covered Plaza. Twelve Americans challenged twelve Californians to a match, laying out a $1500 bet to make it interesting. The Californians won. Horses were raced near the Plaza, on a racecourse behind the church. A bullring, too, was located near the Plaza during the early 1850s.

Religious processions were held in the Plaza, particularly the Corpus Christi processions late in May. The little salute cannon was fired, the church bells were rung, and later skyrockets and pinwheels were fired in the evening. In 1858 the Corpus Christi festivities included in the procession 120 pupils of the church's school, escorted by the California Lancers and the Los Angeles Rifles, local military companies. Altars were placed before the homes including those of Jesús Domínguez, Ignacio del Valle, Vicente Lugo, and Agustín Olvera. Manuel Requena, Cristóbal Aguilar, Rafael Gallardo and Ignacio del Valle carried the canopy over the Bishop and the clergymen. Another religious procession of note was that of the Queen of Angels in August. As the patroness of the city, her celebration was a cherished one in Los Angeles. A procession of 1857 included the Sisters of Charity followed by their girl students all dressed in white, carrying an image of Our Lady under a canopy. The California Lancers respectfully followed them.

BUSINESS CENTER

Two doors south of the Plaza the Methodists occupied a building as a church during the early 1850s. Reverend Adam Bland was for a short time said to have used the building. In January, 1854, Reverend John Williams, "colored Methodist," probably a member of the African Methodist Episcopal Church, was mentioned as one of the preachers in the El Dorado building. The El Dorado building was a two-story prefabricated frame structure which had been shipped around the Horn to San Francisco in 1849, where it stood for a couple of years, then was dismantled and sent south to Los Angeles about 1852. It was perhaps the first two-story frame building to grace the streets of Los Angeles. The building was used not only as a church but also as a school. According to Horace Bell, it was brought to Los Angeles to serve as a saloon, and other uses were but brief interludes in its career as a groggery. As a saloon the El Dorado did not receive the attention which was given editorially to the Montgomery saloon a block down the street, perhaps because the Montgomery advertised faithfully in the local press. It may not have been the social equal of the Montgomery, however. In 1858 a two-story brick building was constructed in the Plaza area. Just south of the El Dorado Saloon the furniture-manufacturing firm of Perry and Brady hired D. W. Porter and Samuel Ayres to construct their building. It was completed by July, and was rivaled only by the frame structures of the El Dorado and the two-story Bell building at the south end of the block, not to mention

A view of the Plaza, taken about the winter of 1868–1869. Clearly seen are the Carrillo Adobe with a fresh coat of whitewash, and in the left foreground is the tank and building of the Los Angeles Gas Works, begun in 1867. The two-story building in the right center is the Sánchez Adobe, probably the first two-story building in Los Angeles. To the right of the Sánchez home is the two-story brick building of Perry and Woodworth, furniture-makers. The adobe row of buildings behind these in the foreground form a line on Negro Alley. The large tree in the left background is the old Aliso Tree, traditionally supposed to have been a large tree at the time of the founding of Los Angeles.

the two-story adobe belonging to Tomas Sanchez somewhat behind the building. By November of 1858 the Masonic Order Lodge No. 42 had moved in upstairs. The lodge was to tenant the building for ten years. Before the end of 1858 William H. Perry had taken a new partner, and the firm was known as Perry and Woodworth. It is possible that the Masons upstairs were the instigators of the "undesirable" label given the El Dorado, which was too close and perhaps too loud. Certainly by 1859 the El Dorado was not considered a prime place for social gatherings when the Grand Jury recommended suspension of the El Dorado Saloon as a "public nuisance."

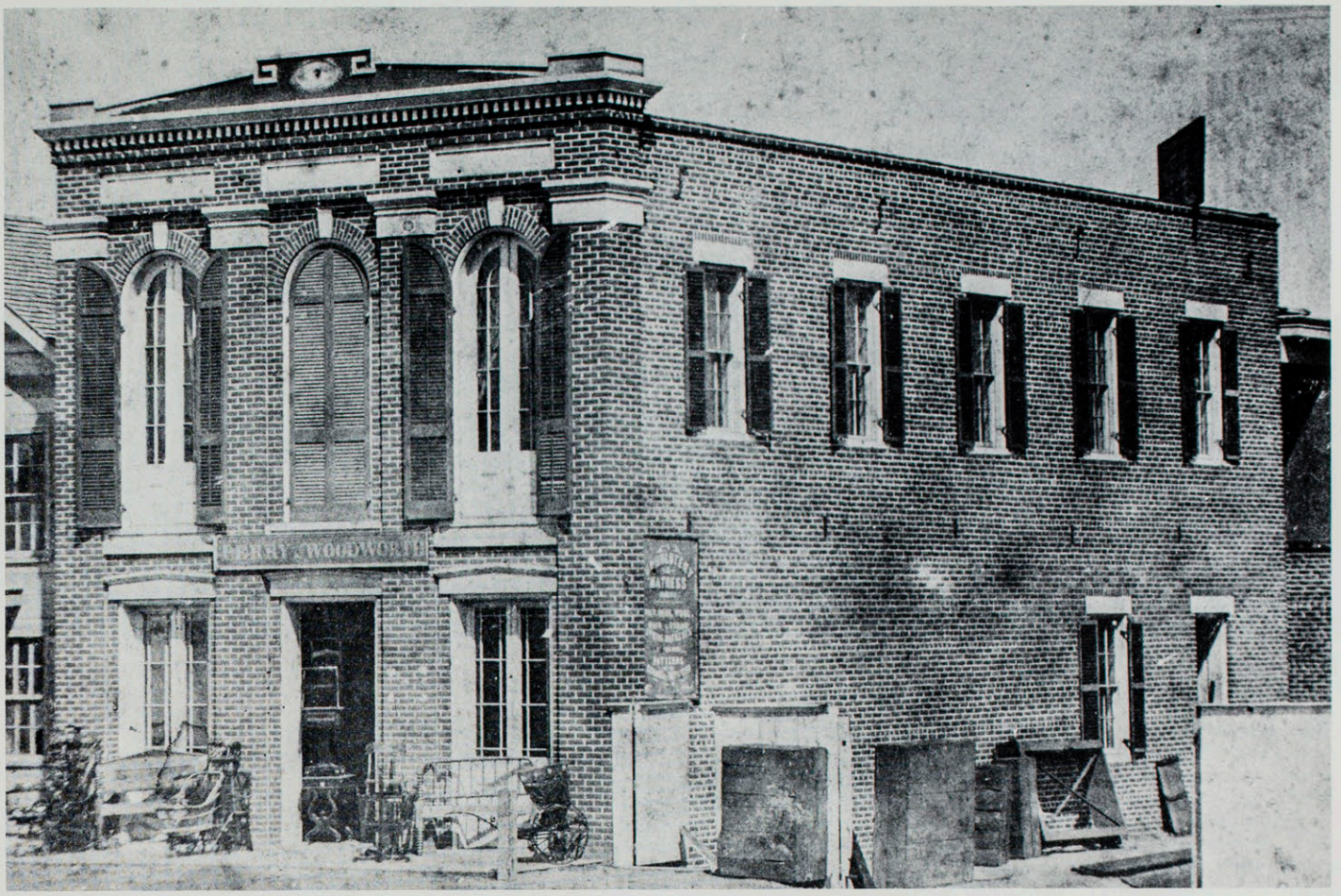
PROFESSIONAL CENTER

Both the medical and the legal profession were to be found in the adobes around the Plaza. A favored medical building was the Del Valle adobe, in the southeast corner of the Plaza. Dr. John Strother Griffin had his office there in 1854. H. P. Swain, a dentist, occupied an office just north above the Plaza on Main Street. In 1866 Dr. Vincent Gelcich, formerly a surgeon with the Union Army, opened his office in the Del Valle building after Dr. Griffin had moved south to First St. In 1867, when Dr. Gelcich became Los Angeles County physician, his office became the County Hospital. He retained his office in the Del Valle building at least as late as 1871.

Lawyers, too, were to be found around the Plaza, and not without reason. The judiciary was represented in the persons of Agustín Olvera and John G. Downey, while Benjamin Hayes opened an office on Main Street just off the Plaza. Myron Norton, an early Los Angeles lawyer, worked in the Del Valle building in 1852, while the firm of Casanova and Jones had their offices in the Olvera home itself. It should come as no surprise that political rallies converged on the Plaza enthusiastically during elections. Upon the announcement of a victory, parades of political partisans, usually Democratic, would gather outside the homes of Agustín Olvera, John Downey, or Antonio F. Coronel. The latter lived a block south of the Plaza, and was a political kingpin in both state and local offices. Demands for speeches were usually met by the politicos during these rallies, and the Plaza was ablaze with torches, bonfires, transparent illuminated banners and fireworks. The California practice of blasting an anvil into the air with a dash of gunpowder was another bit of local political entertainment. The Plaza as the political navel of Los Angeles began to shrink somewhat when the U.S. District Court was moved from the north side of the Plaza south to Temple's building in 1862. Perhaps the apogee of the Plaza's political glory came in January, 1860, when a 100-gun salute, a torchlight parade with all the trimmings, and a rousing celebration crowded the square to celebrate Downey's elevation to the governorship of California.

GRADUAL DECLINE

Several factors contributed to the decline of the Plaza as the town's center. The most pronounced changes came during the 1860s, when the movement toward the southern part of the town became more pronounced. A major factor in the decline was no doubt the economic dislocation caused by the great cattle losses during the extreme drought of 1862–64. More than merchants, artisans and fruitgrowers, this cataclysm affected the Mexicans and Americans who had been longtime residents of Los Angeles. Economic hardships were keenly felt north of the Plaza, though few in Los Angeles were



Perry and Woodworth Furniture Company, circa 1860. Constructed in 1858 as Perry and Brady's furniture company, it is better-known as Perry and Woodworth's, the partnership formed shortly after the building was completed. The upstairs portion of the building was let to the Masonic Order upon completion of the building. The Masons moved into the building by November of 1858. D. W. Porter and Samuel Ayres were the builders of this early brick edifice in Los Angeles. To the left of the building can be seen a portion of the El Dorado Saloon building, which was removed in 1868.

unaffected. Even a smallpox epidemic struck in 1862–3. The Civil War had some effect in dividing the town politically, leaving a few scars. By 1870, the axis of the town had shifted to the area where Main and Spring Streets converged at John Temple's two-story adobe, and where Commercial Street led from Main Street east to the new depot of the Los Angeles and San Pedro Railroad.

The Plaza was far from dead, however. The Carrillo adobe at the southwest corner of the Plaza was demolished in September, 1869, and on the land, Pío Pico bet a large amount of money on the Plaza's future by constructing his famous hotel, the first three-story building in Los Angeles. This building was designed by E. F. Kysor, and construction was done by Stappenbeck and Switzer. By June 19, 1870, the Pico House was opened to the public. Painted to resemble blue granite, and well-furnished by Los Angeles hotel standards, the Pico House was the outstanding hotel in the city for years. With its carpets and drapes, 81 rooms, walnut furniture, speaking tubes, bell wires, and even a dumb-waiter, it represented an opulence hitherto unknown in the city. On the ground floor, a patio with a fountain ornamented the center of the building.

A second attempt to stem the southward movement of the city's center was the construction of the Merced Theater next door to the Pico House. The site was owned by William Abbott and Merced García de Abbott. They had owned the old El Dorado saloon building, which was moved near Aliso Street. After the El Dorado was moved in August, work on Abbott's theater building began in September. With E. F. Kysor as his architect, Abbott had the firm of Griffith, Lynch, & Co. do the inside woodwork. Work was completed within four months, and the three-story Merced Theater, named for Merced Abbott, opened with a concert and speech on December 30, 1870. The Wilmington Band gave the concert and H. K. S. O'Melveny gave the speech. The festivities were completed with a ball. Within a month plays were regularly scheduled. "Laughing Gas" was shown in January, and by the end of that month San Francisco impresario Tom Maguire was sending some of his road companies south to the Merced.

Through the 1860s the Plaza had retained some of its prestige as an important focal point of civic affairs. A Catholic school in the Lugo House was an important feature through the 1860s. The grading of Main Street from the Plaza to Arcadia Street, the first block to be accorded this honor in the city, was done in 1866, with additional grading down Main Street by 1870. Celebrations of Mexican Independence Day in September continued into the 1860s, though in 1869 the festivities were held in Los Angeles Gardens, on San Pedro Street. Perhaps construction of the Pico House was an impediment. Complaints about the "unsightly" state of the Plaza and its environs were frequent in the press during the late 1860s. Particularly offensive to the editorial eye was the brick water tank in the middle of the Plaza, finally removed in 1871. Dead dogs, cats, and chickens were too frequently found in Sánchez Street. The deceased roosters found there were the losers in the frequent weekend cockfights held in the area. North of the Plaza was another problem to the civic-minded people of Los Angeles. In the Bath Street (now North Main) adobe buildings belonging to Doria Jones and others, lived several prostitutes. They had the bad habit of enthusiastically calling out to potential customers on the street, using

TOP: *Panorama of Los Angeles Plaza, spring, 1870. The Pico House, nearly completed, dominates this photo on the right. To the extreme right is the Perry and Woodworth Building, with the Masonic Hall no longer upstairs, as the order had moved about a year before. The Lugo House, by now a Catholic school, is the imposing building on the east side of the Plaza. Immediately in front of it is the Plaza Reservoir. On the west side is the Plaza Church, with the Priests' House extending from it to the left. What appears to be part of the building is in reality Pierre Domec's bakery next door. Just to the right of the clump of trees on the north side of the Plaza can be seen the Olvera Adobe, with Olvera Street leading northward past the Avila Adobe, the inconspicuous one with the corridor in front. The building to the far left background is the Sisters of Charity School.*

LOS ANGELES 1870 PLAZA

LOS ANGELES 1872 PLAZA

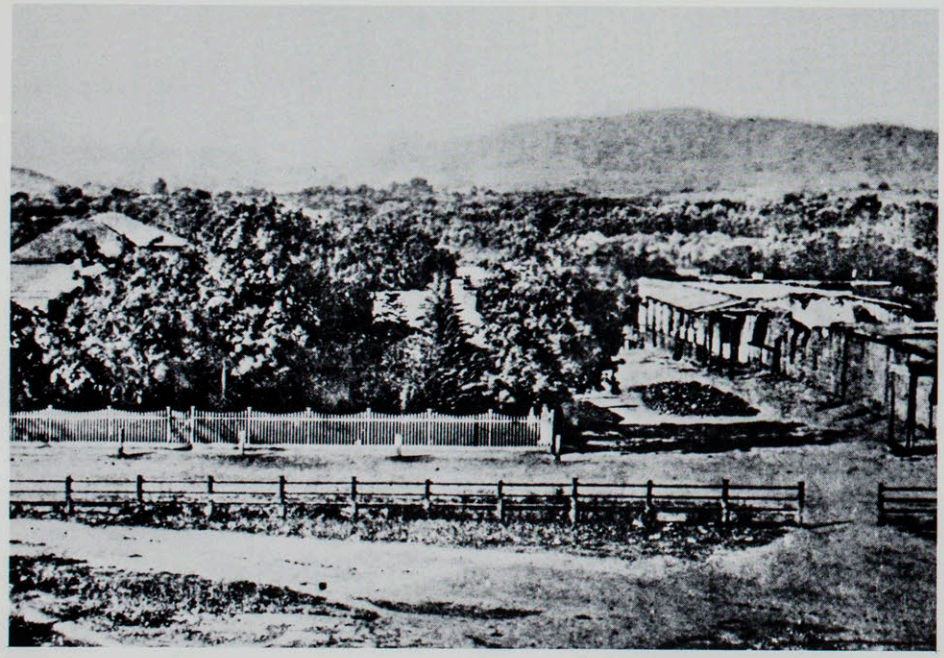
BOTTOM: *Panorama of the Los Angeles Plaza, circa 1872. The new Pico House and Merced Theater on the right overlook signs of evident decay, despite efforts to renew the Plaza and the buildings adjacent to it. The Plaza itself has changed shape, with plans for the circular park of today. A fountain in the center of the Plaza is visible, while immediately behind it is seen the Olvera Adobe, with Olvera Street leading to the left. In the distance is the Sisters of Charity school. The Plaza Church, with its wooden belfry, is in the left center of this panorama. The smokestack sticking up is part of the gas works, and a gas tank can be seen just to the right of the stack. On the far left is the new Beaudry Building on New High Street. This building, its facade highly modified, can still be seen at 501 New High Street.*

"coarse" or "vulgar" language, when they were "nude or semi-naked." This was observed by school children leaving Bath Street School at the north end of the block during the afternoon. The court ordered the ladies to stay indoors and behave with more propriety. This little redlight district was located within one hundred feet north of the Plaza. Another often-cited problem confronting the Plaza was the growth of a Chinatown on Negro Alley during the 1860s. By 1864, there were Chinese merchants and possibly a few Chinese prostitutes in the street. The growth of the Chinese population at the end of the decade prompted adverse comment from the *Los Angeles News.*

Olvera Street from the Pico House, circa *1870. On the left, enclosed with a picket fence and surrounded by a lush garden, is the home of John G. Downey. On the right Olvera Street leads north from the Plaza.*

That the Chinese were disliked by the majority of Los Angeles residents was proven by the savage massacre of Chinese later, in 1871. The reason for the dislike is harder to conjecture. Chinatown had definitely reached the Plaza by 1871 when Quai Ho leased Francisca Uribe de Ocampo's store in the southeast corner of the Plaza.

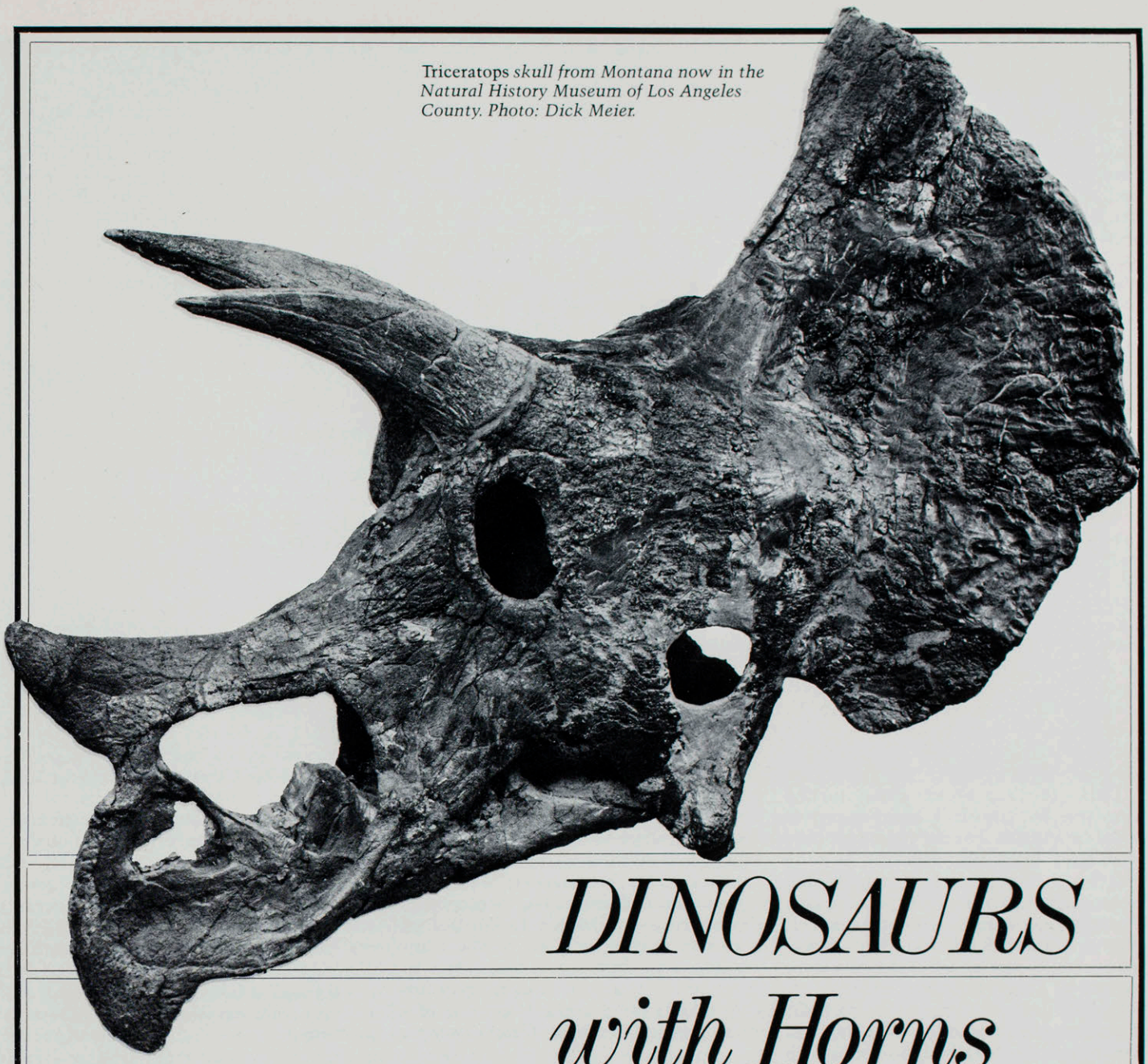
The Masonic order moved from Perry and Woodworth's building in 1868 to new quarters near Temple Street. Still, however, the Plaza was thought by many during the 1860s to be the center of town. Noting the increase of real estate values in the south end of the city, the distance of the property was quoted "from the Plaza," even as late as 1868. For years thereafter many Los Angeles citizens still thought of the Plaza as the center, although the city was growing slowly southward. The governmental, economic and social pursuits of the city were concentrating around the area of Temple and Main through the 1870s. Despite the construction of the Pico House and Merced Theater, the Plaza did not become the seat of influence it had once been. Between 1870 and 1880 the Plaza gradually became a backwater of the city, though the Pico House was one of the better hotels in Los Angeles during that period, and the Merced Theater was also well regarded. By 1880 the Plaza was little more than the gateway to Sonoratown, known by then as "the Mexican quarter." Even the Plaza Church was eclipsed by the erection of Saint Vibiana's Cathedral at Main and Second in 1876. By the 1880s boom the Plaza had become a much less significant part of Los Angeles' social and economic life. First and Main Streets had become the center of the city. The eastern half of the Plaza was part of Chinatown. Even the Pico House and the Merced Theater showed definite signs of neglect. Still, the Plaza was and is a symbol of what Los Angeles had been, and traces of its past glory and earlier history still remain.



Olvera Adobe, ca. 1880. The old former home of Tiburcio Tapia and later Agustín Olvera became a Chinese store and residence sometime prior to 1880. Chinese lanterns, advertisements, occupants, customers, and bystanders can be seen in the corridor. By 1880 the eastern half of the Plaza was largely Chinese.

William Mason, Curator of History, has a remarkable memory and unique knowledge of early Los Angeles and its citizens. His TERRA articles on The First Blacks in Los Angeles *and* The Japanese of Los Angeles *have become collector's items.*

Jeanne Duque has a family interest, as well as a scholarly one, in early Los Angeles history. She is Chairman of the Natural History Museum Alliance.



Triceratops *skull from Montana now in the Natural History Museum of Los Angeles County. Photo: Dick Meier.*

DINOSAURS with Horns

by EDWIN H. COLBERT

Several years ago a group of paleontologists from the Museum of Northern Arizona discovered some large fossil ribs protruding out of the side of a small cliff in the San Juan Basin of New Mexico. They dug into the hard Cretaceous sandstone of the exposure with hammers and picks, and shortly came upon a large, flat fossil bone. As they dug deeper and deeper into the rock there seemed to be no end to the bone, but after some hours of careful exploration it began to take shape; it was a "frill" that formed the back part of the skull of a large horned dinosaur.

Such a discovery meant hours and days of hard work under the hot, desert sun, but in the course of time the skull lay revealed, upside down as it had been buried so many millions of years ago, a huge fossil some eight feet in length with two large horns extending down into the rock. With the skull were the lower jaws and a considerable part of the skeleton, and what was particularly interesting, the fossilized leaves and stems of plants of many kinds. Here was a record in the rocks, not only of a gigantic reptile of ancient days, but also of the environment in which it lived. Indeed, since there is every reason to believe that the horned dinosaurs were plant-eating animals, this paleobotanical record probably preserves some of the plants upon which the reptilian giant fed.

It was a formidable task to get the fossil together with the rock that enclosed it—all weighing probably about five tons—properly encased in a plaster jacket, supported by huge timbers, separated from its rocky bed and trucked to the Museum. But the task was accomplished, and in time the specimen was sufficiently prepared so that it could be studied. It proved to belong to the genus *Pentaceratops*, a rather rare member of the horned dinosaurs or ceratopsians, known today from a half-dozen good specimens, all collected in the San Juan Basin.

This dinosaur typifies the horned dinosaurs, because all of them were cut to a similar pattern. For the most part they were large, being twenty feet or more in length, with probable live weights that frequently reached ten tons or more. They had capacious bodies and stood on strong legs, with all four feet firmly planted on the ground. But the dominant feature of these dinosaurs was the enlarged skull, of such length that typically it comprised a third of the total length of the animal. The length of the ceratopsian skull was achieved largely by an expansion of the posteriorly located parietal and squamosal bones so that they formed a great, plate-like frill extending over the neck and the shoulder region. In almost all of the ceratopsians the frill was perforated by two large openings, one on each side. (In *Triceratops*, perhaps the best known of the horned dinosaurs, the frill was solid.) The facial part of the skull was compressed in front from side to side to form a sharp beak, somewhat like the beak of a turtle, or more exactly like the beak of a parrot grown to giant proportions. The front of the lower jaw likewise was in the form of a pointed beak. There were no teeth in this beak, but in the sides of the jaws were complex batteries of cheek teeth that served to chop and slice the vegetation upon which this dinosaur fed. Finally the skull was commonly decorated with three horns, one over the nose and one over each eye. (In *Pentaceratops* the jugal bones on each side of the skull are in some cases rather pointed — hence the name *Penta* (five) *ceratos* (horns) *ops* (face). But the spike-like jugals are not true horns.)

Pentaceratops had a number of varied cousins living in North America during late Cretaceous times some sixty-five to seventy-five million years ago. There were *Monoclonius* and *Styracosaurus*, each with a large nasal horn and with very small brow horns over the eyes, *Styracosaurus* in addition having long spikes around the edge of the frill. There were *Chasmosaurus*, *Anchiceratops*, *Torosaurus* and *Triceratops*, all (like *Pentaceratops*) with small or modestly proportioned nasal horns and all with long, threatening brow horns. And there was *Pachyrhinosaurus*, with no horns, but with a large, rugose surface on the top of the skull. These dinosaurs were reptilian giants.

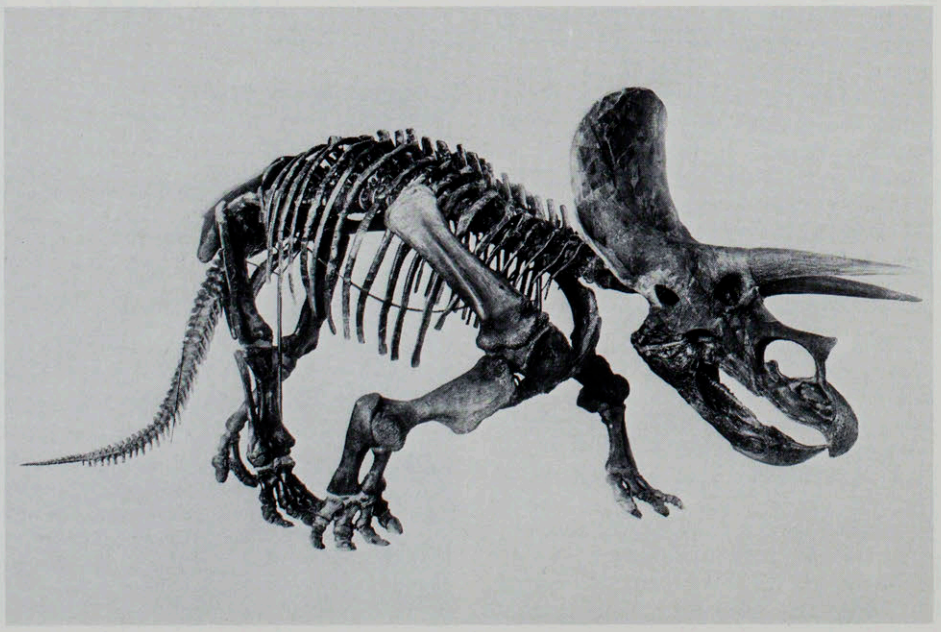
But there was one North American ceratopsian, *Leptoceratops*, that was not a giant. This was a small member of the group, about five feet in length, in which the frill of the skull was only slightly developed, and in which there were no well-formed horns. There is good reason to think that *Leptoceratops*, contemporaneous with some of its gigantic relatives, was a persistent primitive form.

The earliest of the horned dinosaurs are seen in the Mongolian genus, *Protoceratops*. *Protoceratops* was somewhat larger than *Leptoceratops*, being about six or seven feet in length, but it had the large skull with a well-developed frill that was to be characteristic of the later gigantic horned dinosaurs, evidently its descendants. In essence *Protoceratops* was a miniature version of the giant ceratopsians, hornless except that in some of the largest specimens (presumably males) there is the beginning of a small horn on the nose. (*Protoceratops*, when first discovered more than a half-century ago, became famous because with it were found nests of its eggs.)

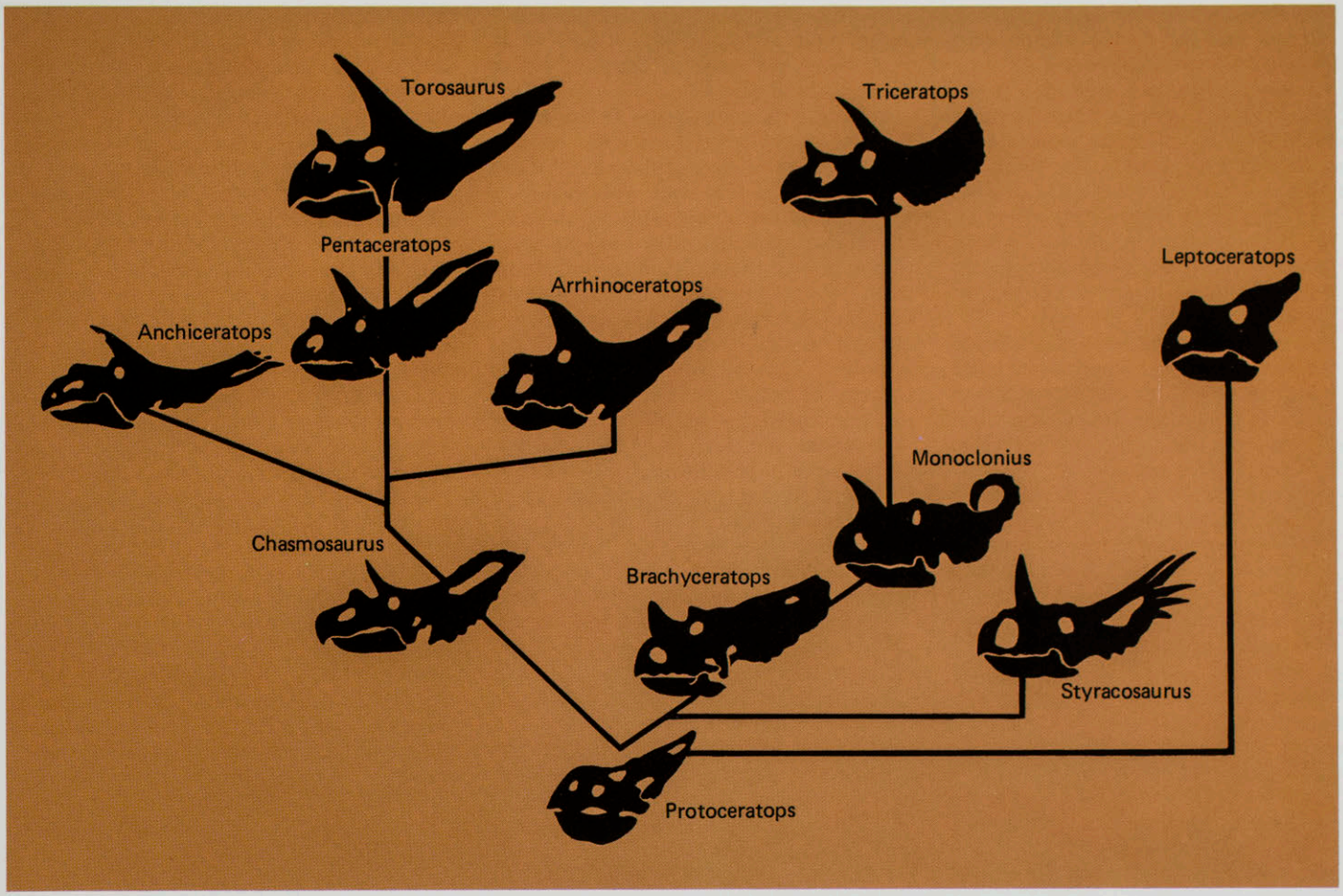
The story of ceratopsian evolution, from the appearance of *Protoceratops* to the extinction of *Triceratops*, the last of these dinosaurs, was a relatively brief history in dinosaurian terms; it began probably about seventy-five million years ago and it ended about sixty-five million years ago, when the Cretaceous Period came to a close. Ceratopsian evolution clearly was restricted to about the last ten million years of the Mesozoic Era, that aspect of earth history often known as "The Age of Reptiles" or "The Age of Dinosaurs."

During late Cretaceous time a long, north and south inland sea occupied the middle and part of the western region of North America, stretching from Arctic waters down to an ancient Gulf of Mexico. Similarly another north to south inland sea, the Turgai Strait, was present in Asia to the east of the Caucasus region, also extending from the Arctic to terminate on the south in the Tethys Sea, the progenitor of the modern Mediterranean Sea. These ribbons of water would seem to have limited the distribution of the horned dinosaurs—to northeastern Asia and to western North America, to a northern land mass the two parts of which were joined by a trans-Bering connection of some sort. The story of the horned dinosaurs is thus restricted in time and in space perhaps to a greater degree than is the case with any of the other large dinosaurian groups.

Why were the ceratopsians so successful during their relatively brief history and in their relatively limited range? Several factors probably contributed to this



Mounted Triceratops *skeleton at the American Museum of Natural History. Photo: Courtesy of the American Museum of Natural History.*



Family tree of dinosaurs with horns. The ancestors below gave rise to other kinds as indicated by branches. Illustration: Mary Butler.

story of success. They may be considered in order.

The horned dinosaurs, like the great majority of dinosaurs, quickly became giants. Of course it can be said that they came into a world dominated by dinosaurian giants, and of necessity they had to become giants in order to survive. There may be something to this, but it is not the whole story. There are some very definite advantages in being a giant, especially when the living is easy, when there is a plentiful food supply and when there are equable climatic conditions—all of which was true of late Mesozoic times, during which tropical, subtropical and warm temperate climates, with consequent luxuriant vegetation, prevailed across wide areas of the continents as they then existed.

Giantism is to a considerable degree a matter of efficiency, of the conservation of energy. As an animal increases in size its surface area increases roughly by the square of its linear dimensions, but its mass increases by the cube of the linear dimensions. Consequently the larger the animal the proportionately less surface area there is in relation to mass, and this means less area of exposure to the environment. This is important for *endothermic* or "warm-blooded" animals that manufacture their own body heat and maintain more or less constant body temperatures, and it is important in a different way for *ectothermic* or "cold-blooded" animals that depend on the temperatures of their environments for their internal body temperatures. Although endothermic animals function rather independently of their environmental temperatures, a large loss of heat and therefore of energy through a relatively large expanse of body surface means that a small animal is less efficient than a large one, in which such loss is comparatively smaller. For ectothermic animals the slower absorption and loss of heat in large animals, because of relatively small surface area compared to mass, means less fluctuation of body temperatures and therefore greater efficiency as compared with small animals. Thus a big alligator, although ectothermic, enjoys some of the advantages of an endothermic animal; it shows comparatively slow temperature fluctuations and consequently lives more efficiently than does its small reptilian relatives.

One may suppose that among the gigantic dinosaurs there were very slow rates of temperature increase and loss, much slower than in the largest modern crocodilians, so that body temperatures remained within a very few degrees of the optimum, day and night, essentially providing the ancient animals with relatively constant body temperatures. (This almost stable body temperature is known as *inertial homiothermy.)* Perhaps such inertial homiothermy, paralleling as it did a condition of endothermy, was the reason for the success of the dinosaurs.

During recent years there has been much excitement (and the word is used advisedly) not only within paleontological circles but also among a large segment of the interested public concerning the possibility that dinosaurs actually were endothermic—having attained this condition quite independently of the warm-blooded birds and mammals. And perhaps that was the reason for the success of the dinosaurs.

While some paleontologists support the idea of warm-blooded dinosaurs with fervor, there are others, and many of them, who oppose the idea with equal fervor. They feel that there was an advantage for the giant dinosaurs in being inertial homiotherms—for one thing such a metabolic pattern would have required far less energy and consequently the intake of far less food every day in order to survive.

However that may be, the ceratopsians became giants to share the advantages of living in a world of giants. In this respect the evolution of the horned dinosaurs paralleled that of many other dinosaurs which had long dominated the conti-

nents. Let us now turn to those evolutionary factors peculiar to the evolutionary history of the horned dinosaurs.

The parrot-like beak and the dental batteries in the sides of the jaws, so characteristic of the ceratopsians, have been briefly mentioned. The beak, for grasping or plucking vegetation, and the cheek teeth, for slicing and chopping, indicate that the horned dinosaurs were efficient herbivores. Perhaps these dental batteries should be described in more detail; not an easy task.

Each tooth is in the form of a vertical rhomb that sliced past its opposing tooth with a scissors-like action, and it terminates at its base in two diverging roots, which enclose the crown of the tooth soon to erupt as the worn tooth drops out. There is a vertical row of replacing teeth above each functioning tooth in the skull, and below each functioning tooth in the lower jaw, so there would have been a constant succession, maintaining a never-ending supply of new teeth. Since there is a rather long row of functioning teeth on each side of the skull and of the lower jaw, often as many as thirty-six to forty in the large ceratopsians, in a horned dinosaur with rows of 40 functioning teeth, there would be a total of $40 \times 4 = 160$ such teeth. Three replacement teeth for each functioning tooth (which seems to be common) add $40 \times 3 = 120 \times 4 = 480$ teeth waiting to come into use. Add all of the teeth together and there is a grand total of $160 + 480 = 640$ teeth, comprising the tooth batteries in one of these dinosaurs.

What did the ceratopsian dinosaurs eat to require such an elaborate mechanism for cutting and shearing plant food? It has been suggested that such a profusion of teeth, constantly being replaced, indicate that these dinosaurs must have fed upon tough, fibrous plants, such as cycads and palms. It will be remembered that when the skull of *Pentaceratops* was unearthed in New Mexico, there were found in the sediments that enclosed it the fossilized remains of many kinds of plants. These include sabalites palms, cycads, and araucarian conifers, which certainly would have provided tough-fibered food for the dinosaur. But in addition there are several species of figs and there are grapes, as well as viburnum, laurel, willows, poplars, and other broad-leaved trees. One wonders if perhaps this *Pentaceratops* was more catholic in its tastes than theory requires; with such an abundance of good food around, may not the dinosaur have availed itself of a wide variety of plant fare?

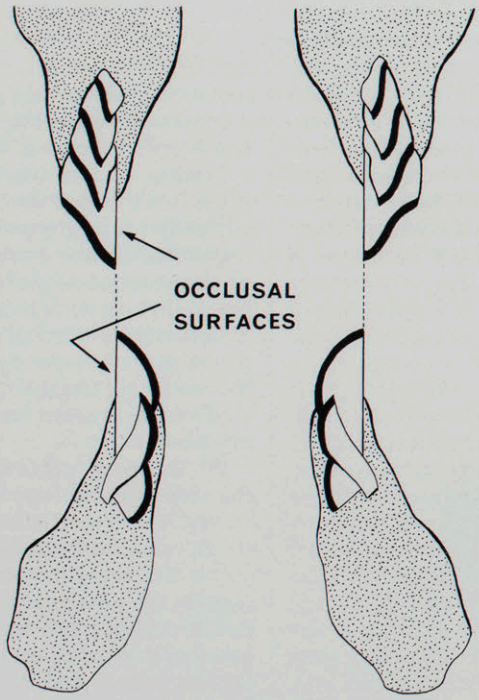
Of course the frill and the horns are the most distinctive features of the ceratopsian dinosaurs. There has been much speculation as to how these functioned in the lives of the animals. Early students of the horned dinosaurs thought that the frill probably formed a shield to protect the vulnerable neck against the powerful jaws and the sharp, dagger-like teeth of the gigantic carnivorous dinosaurs that shared Cretaceous landscapes with the ceratopsians. This does seem like a logical interpretation for the frill.

Subsequently, however, close studies of the anatomy of these dinosaurs indicated that the frill was a base for muscle attachments—for the muscles of the neck that fastened to the head, and for long, powerful jaw muscles that activated the lower jaw to make the tooth batteries very effective shearing mechanisms. This explanation for frill function became so well established that the possibility of the frill as a protective shield became a very secondary consideration.

In recent years there has been a growing sentiment to regard the frill as an agonistic feature—that is as something to be used in display between individual ceratopsian dinosaurs in order to establish intraspecific dominance. Here a comparison may be made with modern animals, notably the frilled lizard of Australia *(Chlamydosaurus)* and various horned or antlered hoofed mammals. In the frilled lizard there is a fold of skin around the neck that can be erected into a truly spectacular ruff when the animal is threatened, thus making the lizard look much bigger than it is. This is useful in the kind of bluffing game so widely practiced among animals of various kinds. A similar kind of behavior is seen, for example, among deer; often the male with the largest antlers displays them in a manner intended to intimidate a rival who may have small antlers.

Among the ceratopsians, *Pentaceratops* and a number of related forms had very long frills. Perhaps at a meeting of two rivals each would lower his head in order to display the frill in its largest aspect, each thereby threatening and intimidating the other. The winner in such a display might thereby establish his dominance. Other ceratopsians such as *Triceratops* had somewhat shorter frills, and perhaps frills of this type were not quite so effective in display as were those of the long-frilled types.

Some modern students of horned dinosaurs have suggested that the display function of the frill was equally as important as its use for muscle attachment, just as earlier students had thought that the function of the frill for muscle attachments was equally as important, or even more important, than any possible use as a protective shield. But could not the frill have had multiple uses—as a shield, as a base for muscles and as a display structure? One need not consider the possible functions of the frill on an either-or basis. Whether the frill in the ceratopsian dinosaurs served one or several simulta-



Diagrammatic sections of upper and lower Triceratops *jaws showing functional teeth at surface underlain by unerupted replacement teeth. As jaws closed, enamel on teeth surfaces met in a scissor action, thereby cutting up the food. Illustration: Mary Butler, after Ostrom.*

Artist's concept of a Triceratops *herd. Painting by Mary Butler.*

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M. Butler

neous functions, it was obviously of great significance for the survival of these reptiles. It was a characteristic and striking feature of ceratopsian morphology throughout their evolutionary history.

The horns likewise were characteristic features of the ceratopsians, perhaps not so unusual as was the frill, but none the less structures of evident importance during their evolutionary development. Indeed, the horns had much to do with making the ceratopsians the kinds of dinosaurs they were. When the first ceratopsians were discovered about a century ago, it was naturally assumed that the horns were for defense against huge carnivores such as *Gorgosaurus* and *Tyrannosaurus*, and this idea has persisted. It is a logical interpretation, and there is no reason to doubt that the horns were lethal weapons that served any ceratopsian well when attacked by a giant predator. But if horns were merely for defense against predatory attacks, why were there several patterns of horn development in these dinosaurs?

Here it may be useful to look at the modern African antelopes. Among these animals there is an almost bewildering array of horn patterns, all seeming to serve a single purpose. Careful studies have shown, however, that the horns in antelopes are not only for defense against predators, but perhaps more importantly they serve as weapons for intraspecific combat among males to establish dominance. Interestingly, they are usually so shaped that the males can battle ever so furiously, usually without injuring one another. It is a case of locking horns in the literal sense, and pushing and shoving until the winner prevails and the loser runs away. Perhaps the same was generally true for the horned dinosaurs.

It may be, however, that among those ceratopsians with long nasal horns there was considerable thrusting between rival males with resultant injuries. Among modern rhinoceroses this is the case; even though male rivalry is based to a large degree on bluff and evasive maneuvering, still the contests may escalate into battles, during the course of which injuries occur. But in the ceratopsians with long brow horns, it seems likely that combats between males may have been like those seen among modern cattle, with a great deal of shoving and "horn wrestling" but with few injuries. In *Pachyrhinosaurus*, with the bony boss on top of the skull, there may have been butting contests, or perhaps head to head shoving.

Among those ceratopsians with long brow horns, analyses show that when the skull was lowered the horns were directed forward, with the lines of force extending along the horn axes and through the occipital condyle—the ball-like joint between the head and neck—and into the neck. They were fearsome and powerful lines of force. It may be envisioned that when two such rival ceratopsians met they lowered the head, thereby exposing a great expanse of frill as a threatening display, and if this did not suffice, they locked horns and pushed and shoved until one gave way. In all of the horned dinosaurs the elbows were everted, so that the front legs could be widely spread to afford a wide base of support for such tactics.

One wonders if the possession of horns made the ceratopsians truculent animals, similar to some of the modern rhinoceroses. Such might have been the case, and indeed the horned dinosaurs have sometimes been designated (purely in a behavioral sense) as "dinosaurian rhinos."

Certain other aspects of possible ceratopsian behavior may be considered here. The discovery of nests of eggs with the skeletons of *Protoceratops* has been mentioned. There is every reason to think that the giant successors of *Protoceratops* laid eggs in a typical reptilian fashion. Eggs of other large dinosaurs have been found. What happened after the nest had been dug, the eggs deposited in the nest, and then covered by earth or sand, to be incubated by the heat of the sun? (Such is the common procedure among modern reptiles.) Did the female ceratopsian abandon the nest to the vagaries of nature and the onslaughts of nest-robbing animals, as do the giant marine turtles of today? Or did she stay close by to guard and protect the nest as do modern crocodiles and alligators? We can only guess. But since crocodilians are the closest modern reptilian relatives of the dinosaurs, it is not too far fetched to think that perhaps the dinosaurs did guard their nests.

Some recent studies have revealed that there is a surprising amount of maternal

Clutch of Protoceratops *eggs from Mongolia now at the American Museum of Natural History. Photo: Courtesy of the American Museum of Natural History.*

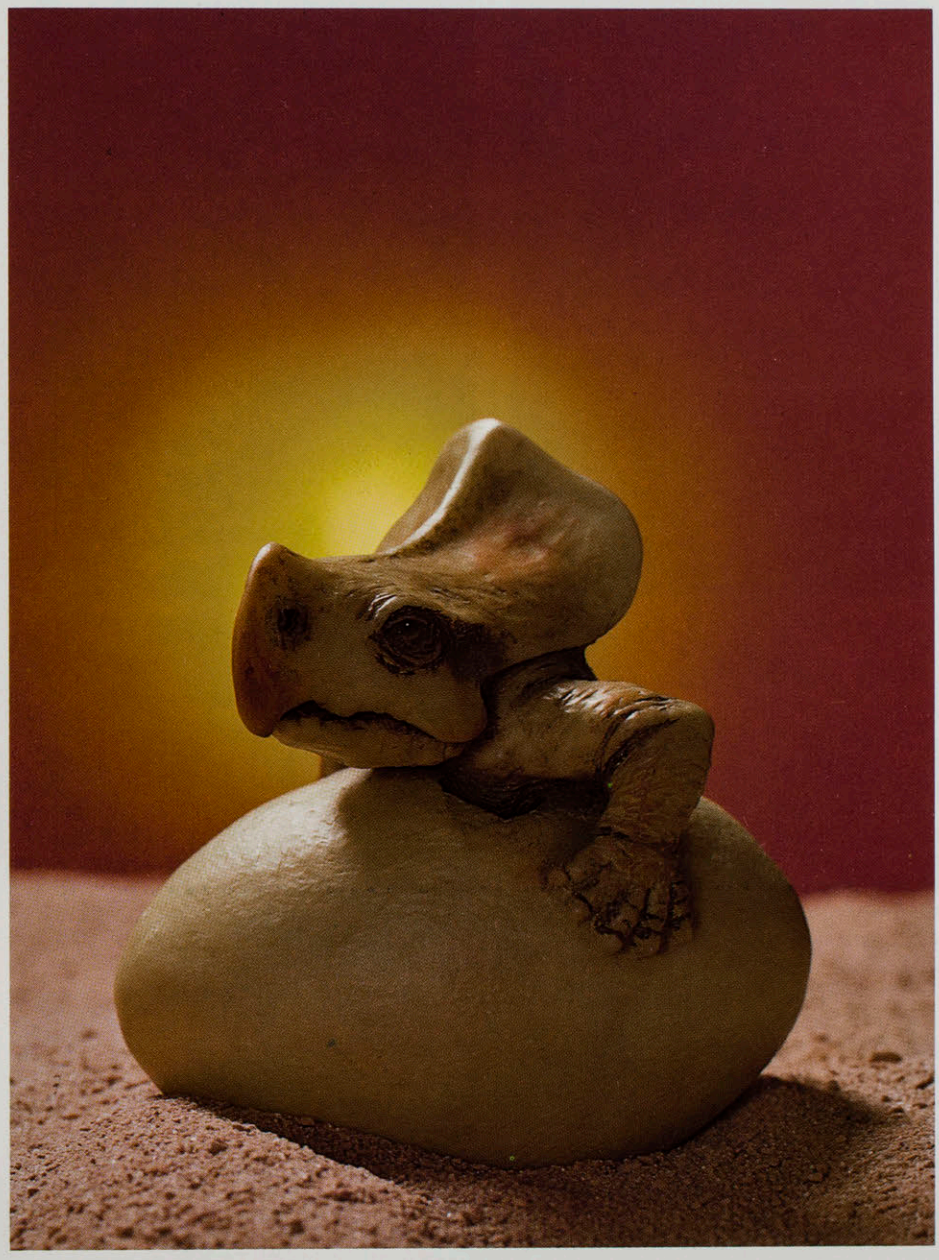
care of the young among the crocodilians. Not only does the female guard the nest; when she hears the hatchlings croaking to get out of their little prisons she opens the nests and cracks the eggs with her teeth, thereby facilitating the emergence of her babies. Furthermore, she picks up the young animals in her mouth and carries them to water nearby, where they will be relatively secure.

It may be that there was a considerable amount of maternal care among some of the dinosaurs. A well-known painting, showing *Triceratops* guarding her young offspring against an attacking *Tyrannosaurus*, a picture that has been criticized as being "unreptilian," is perhaps not so erroneous after all.

The abundant remains of *Triceratops* in Upper Cretaceous sediments leads one to think that these horned dinosaurs might have traveled in large herds, as do many modern hoofed mammals. Trackways of other dinosaurs have indicated that they may have congregated in large groups. Such a behavior pattern would have been mutually protective, not only to the adults but to juveniles as well. Here is a matter for speculation, as is often the case in looking at the dinosaurs, but speculation based upon what we know of modern animals to give us some useful clues concerning reptiles long since extinct.

The horned dinosaurs became extinct at the end of Cretaceous time, as did all of the other dinosaurs. As for the reasons for their extinction, speculations are rife and never ending. Here we lack any very good modern comparisons, as has been the case for anatomical specializations, possible habits and the like, and so the speculations are just that. They are too numerous and involved to be considered here; they would make an article, or a book, by themselves. Suffice it to say that they range from ideas of temperature changes, changing food supplies, the decrease in the viability of eggs, "senescence" (whatever that may mean), to catastrophic events, not the least of which is the possibility of a huge meteor impact or the explosion of a supernova, with concomitant effects on life on the earth. But for every theory there are objections, so the problem very likely will remain a subject for arguments during unseen years in the future.

Such is the background against which one may view the skull of *Pentaceratops*, entombed so many millions of years ago with some of the plants that formed its environment draped around and over it like a green garland to decorate the massive grave. The dinosaur in itself is impressive, an enormous skull that was once the horned prow of a massive and aggressive reptile. Yet when we look at this skull in the greater dimensions of its background, we see a fascinating picture of ancient complexity. It is the picture of horned and frilled giant herbivores that inhabited the west side of an ancient North American land mass, cut off on their eastern flank by a long, narrow, north to south sea, but extending across a trans-Bering connection into what is now the eastern part of Asia, and there cut off on the west by a seaway. It is thus a picture of a group of dinosaurs limited in their geographic range, and likewise limited in their temporal rule. The ceratopsians, among the last of the dinosaurs, had an evolutionary life that was comparatively brief, but while it lasted it was a dynamic and a very successful existence.



Birth of a ceratopsian. Model by Los Angeles artist Sylvia Massey. Photo: Robin Robin

The skull illustrated at the beginning of this article is part of a complete skeleton that will shortly be assembled for exhibition in the William T. Sesnon Mesozoic Hall.

Edwin H. Colbert received his Ph.D. from Columbia University and became Chairman of the Department of Vertebrate Paleontology at the American Museum of Natural History as well as a professor at Columbia. After his retirement he became curator of Vertebrate Paleontology at the Museum of Northern Arizona in Flagstaff, where he continues to add to his impressive list of books and scientific articles, especially about dinosaurs.

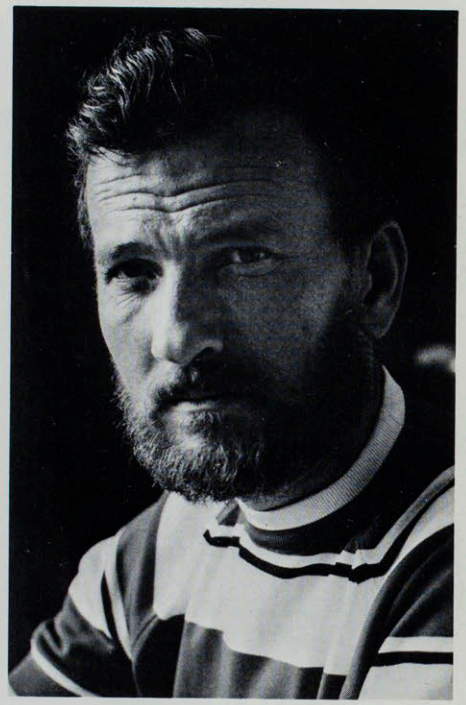
Navaho Weaving Exhibit

A temporary exhibit telling the story of Navaho weaving recently opened on the second floor of the Museum. Utilizing the Museum's vast holdings of Navaho textiles, examples of their weaving skills are shown with pieces dating from 1800 to the present. Also explained are the many additional steps that are necessary to the production of a textile including sheep-shearing, cleaning of the fleece, carding, spinning and dyeing the wool. Some of the changes which can be seen in Navaho textiles over the years are reflected in their dyes, yarn types and design elements. The changes mirrored events which occurred on a larger scale to the Navaho people with the settlement of the West.

The exhibit runs through March 8, 1981.

(Continued from Page 2)

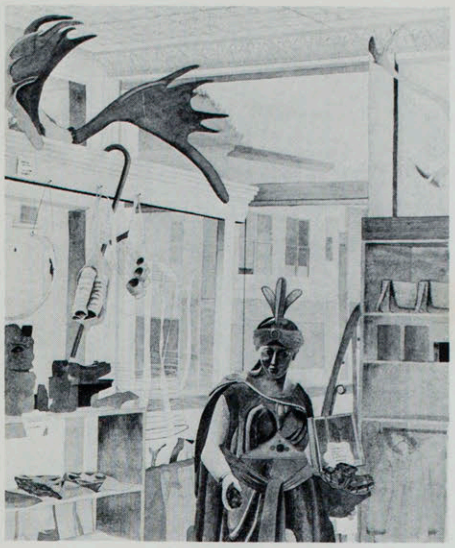
Dr. Harris is particularly interested in African fossil ungulates and has written papers on fossil antelopes, giraffes, camels, pigs, hippos, rhinos and deinotheres (extinct distant relatives of the elephant). During the past year, he was the recipient of the first William M. Garland Memorial Fellowship from the Foundation for Research into the Origin of Man and, while based at the University of Bristol, completed the first of two monographs on the Koobi Fora fossil ungulates for the K.F.R.P. monograph series published by Clarendon Press. Dr. Harris hopes to have the second volume substantially completed before the summer of 1981, when once more he will be participating in further field work along the shores of Lake Turkana (Museum duties permitting!).



New Exhibitions Chief

Frank Ackerman, the Museum's new Chief of Exhibitions, has a broad-based background in the arts, and a special interest in natural history. Ackerman, who has come to the Museum from a job as Graphics Arts Coordinator (Art Director), County of Los Angeles, grew up in Glendale and graduated from Chouinard Institute. He has had a number of one-man watercolor shows and is a member of the Glendale and Los Angeles Art Associations, West Coast and National Watercolor Societies, and the Society of the South Pole, among others. He was commissioned by the United States Navy to paint in Antarctica and lays claim to being the first artist to do a painting at the South Pole on location. Ackerman admits to a passion for Alaska, especially Skagway. He and his wife have been there a number of times and his watercolors of the Klondike gold mining town are ex-

tensive. He has won numerous awards and his paintings grace many private collections.



Skagway antiques. Watercolor by Frank Ackerman.

Hands Across The Sea

Dr. William B. (Pete) Lee, Director of the Natural History Museum of Los Angeles County, presented Dr. Wu Wang-Shi with some of the Museum's scientific publications for the library of the Institute of Geology and Paleontology in Nanjing, People's Republic of China. Dr. Wu, a paleontologist at the Chinese institution, studied fossil corals in the Museum collections with Dr. Edward Wilson in December for one week. Her four-month visit to the United States is sponsored by the Committee on Scholarly Communication with the People's Republic of China and includes working with paleontologists at museums and universities in California, Oklahoma, Texas, Washington, D.C., and New York. Scientists from the United States will visit China for reciprocal studies.

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To highlight the current HAWAI'I: THE ROYAL ISLES exhibition, the Ethnic Arts Shop now has many indigenous crafts from Hawaii and Polynesia. Most distinctive of these is tapa. Once the chief form of cloth in the South Pacific, tapa is still used today on ceremonial occasions. It is made completely by hand from the bark of the mulberry tree and only natural pigments are used to paint the designs, which are traditional to each tapa-maker's family.

$4.75 to $135.00

In the Book Shop...

The limited edition catalog from the special HAWAI'I: THE ROYAL ISLES exhibition includes 60 color plates and 90 black and white photos. The informative text was written by Adrienne Kaeppler, now curator of oceanographic ethnology at the Smithsonian Institution. Telephone orders accepted, call (213) 744-3434.

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